VILLAGES, TOWNS AND SECULAR BUILDINGS IN ANCIENT INDIA

AMITA RAY

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VILLAGES, TOWNS AND SECULAR BUILDINGS IN ANCIENT INDIA

c.150 B.C.—c.350 A.D.

By

AMITA RAY

M.A., D.PHIL. (Cal.)

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For

MY MOTHER

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AMITA RAY

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VILLAGES, TOWNS AND SECULAR BUILDINGS IN ANCIENT INDIA

APPROACH

EARLY Indian architecture as known from extant examples, is almost exclusively religious, that is, all resorts or edifices, whether rock-hewn or structural, that have come down to us, are those of gods or godly heores, of religious seers and saints, or are connected in some way or other with religious purposes. They are *stūpas* or *chaityas* or *vihāras*, *bodhi-gharas* or *bodhi-maṇḍapas*, *devakulas* or *devālayas*. Yet in early Indian literature, one reads frequently of *manushyālayas* or human abodes too, of *gṛihas* and *āgāras*, of *prāsādas* and *durgas*, of *setus* and *prākāras* etc. as well as of *grāma-sanniveśa* and *nagara-sanniveśa* along with descriptions of villages and cities with their variety of houses meant for the dwelling of mere mortals, dwellings set in the midst of tanks and gardens, fields and meadows and lined by rivers and forests. Indeed, if men provided their gods and heroes with imposing shelters, they did not deprive themselves altogether; only they paid higher premiums to their gods and heroes and built more solid and secure shelters for them in more durable materials, and remained satisfied by sheltering themselves in buildings of humbler materials and of humbler proportions.

It is, therefore, easy to postulate that there was a secular or civil architecture in ancient India side by side with the religious. But since this architecture was almost solely in relatively impermanent materials like bamboo and straw, reed and cane, terracotta and brick etc., time devoured them all as easily as they were built without leaving any trace behind. Their memories alone are preserved in contemporary and later texts. But unfortunately such descriptions as contained in them, give us but very inadequate idea as to their shapes, forms and techniques. Varieties of types and forms are mentioned in these texts, but the technical terms by which these types and forms are referred to, are not always self-explanatory and hardly give us any clue by themselves as to what they stand for. Ancient Indian secular architecture has, therefore, long been a somewhat sealed book to us.

It was Ananda K. Coomaraswamy who, for the first time, sought successfully to find the key to this sealed book. In 1930, he wrote a path-finding paper on *Early Indian Architecture*, in course of which he gave an exhaustive analysis of many types and forms of buildings represented on the bas-reliefs of early Buddhist and Jain sculpture, with special reference to cities and city buildings, *bodhi-gharas* and palaces. He also described them with references to such Pali, Prakrit and Sanskrit technical architectural terms as one comes across in early Buddhist, Jain and Sanskrit literature. In certain instances he also illustrated parallels from mediaeval Hindu architecture.

Since Coomaraswamy wrote not much has been done by way of reconstruction of the history of early Indian secular architecture from archaeological materials, or by way of corelating literary evidence with archaeological examples of architectural types and forms. C. Sivaramamurti in his interesting monograph on *Amaravati Sculptures* and Moti Chandra in his equally interesting paper on *Architectural data in Jain Canonical Literature*,[2] have added valuable notes to the original findings of Coomaraswamy, but such additions to knowledge have not been very considerable, either in quality or in quantity.

The present monograph is frankly inspired by Coomaraswamy's paper referred to above. But it seeks to widen the scope of enquiry and to fill in the gaps that Coomaraswamy did not feel called upon to do. For instance, Coomaraswamy did not give sufficient consideration to the humbler dwellings of the poorer folks in the villages or of still humbler shelters of hermits and mendicants. And though he chose to describe cities, city-buildings and palaces, he did not pay sufficient attention to the question of city-planning in its historical and technical perspective just as he did not choose to speak of village-planning and its evolution. He points out very clearly that all cities in ancient India were fortified, but he says very little about building materials and building techniques. Nor does he say anything about the rites and rituals that until very recent times, played such an important part in building activities in Hindu India. But the most important thing that one misses in his very significant paper referred to above, is the absence of any consideration of the aboriginal and indigenous prototype of the various forms and types of building that one finds represented on early Indian reliefs.

What has, therefore, been attempted in this monograph is to cover more or less the same ground as traversed by Coomaraswamy, and to stress at the same time the points not touched altogether or only insufficiently dealt with by him. An attempt has also been made to supply the lacunae in the arguments and analysis of Coomaraswamy. But apart from strengthening the position of his pioneer work, this monograph tries to explain all types and forms of secular architecture of ancient India against their proper setting, that is, in the context of village and city-planning, and attempts to relate them with aboriginal and indigenous arcitectural activities. In doing so, it proceeds on the premise that ancient Indian social and economic pattern evolved integrally from the basic aboriginal (tribal and rural) pattern of life, and as a corollary, the architectural types and forms that we find on early Indian bas-reliefs, also evolved from the rural and tribal house-types and forms, not only in their general outline but in many architectural details as well. This monograph makes an attempt to establish this premise on more or less solid arguments of ethnology and archaeology.

Emphasis has also been sought to be laid on the question of materials used and techniques employed in early Indian building activities for purpose of human dwelling. A separate chapter has also been added on rites and rituals connected with such building activities. Most of the rites and rituals referred to, apply to religious architecture as well. But in any study of secular architecture in India they have a relevance that cannot be ignored.

Chronologically the monograph covers the period from about 150 B.C. to about 350 A.D., but the materials utilised in analysis and explanation of the planning of towns and villages and the architectural types and forms, belong to a somewhat wider range at both ends, that is, from *c.* 600 B.C. to *c.* 600 A.D., except in a few cases where earlier or later materials have also been cited to strengthen a given argument or to show the continuity of a given type or form, material or practice, or a tradition. But since the monograph seeks to establish itself on the solid ground of archaeology, all evidence irrespective of the period they may be assigned to, has been sought to be directed towards the narrower circuit of 150 B.C.—350 A.D., the period of early Indian narrative reliefs which, roughly speaking, may be said to represent the life of very large segments of ancient India for about five hundred years.

A glance at the arrangements of chapters as given in the contents will, it is hoped, show the logic that underlies this study. Any further explanation may, therefore, be considered unnecessary.

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Chapter One

TRIBAL AND RURAL SETTLEMENT PATTERNS AND HOUSE-TYPES

I. Introductory Remarks

Nothing so clearly illustrates the characteristic other-worldliness of traditional Indian thought and activities than the history of early Indian architecture. It is not in the least surprising that whatever extant specimens of building activities of the Hindus, Buddhists and Jains have come down to us from those distant days relate themselves to some religious symbols, ideas or organisations, whether it is a Buddhist or Jain *chaitya*, *vihāra* or *stūpa*, or a Brahmanical temple. Yet it is hard to imagine or believe that the teeming millions who subscribed to these faiths and who were responsible for the rearing up of these religious edifices, did not build cottages and richer houses and palaces to shelter themselves. Indeed, not only in the Epics and the Purāṇas, in early Buddhist and Jain texts and in the poetical and dramatic literature of ancient India have we elaborate descriptions of various kinds of dwelling houses ranging from very humble and modest shelters made of leaves, branches, reeds, bamboo, mud and straw to big palaces and forts made of wood and brick etc., but there are also technical treatises or chapters in such treatises giving details of village and town-planning, materials and methods of construction, and names and specifications of various types of buildings from the lowliest and simplest to the most elaborate and magnificent. Yet, it is significant that, nothing to speak of the legendary palaces described in the Epics, even the ruins of the magnificent palaces and the audience halls etc. of the Mauryas, for example, which we read descriptions of in classical accounts or of those of the Guptas and many other royal dynasties, have not survived the ravages of time and nature. Excavations at different archaeological sites have no doubt laid bare the foundations of a few ancient cities from which a rough idea can be gathered of the general lay-out of such cities, but rarely so of any structure that stood on them. Indeed, hardly any structure that was meant for a dwelling house of mere mortals and datable before the late medieval period, has come down to us.

The reason is not far to seek and has perhaps to be attributed to the peculiar attitude of the traditional Indian mind. Only the immortals who were none but the gods and goddesses themselves, needed permanent habitation; since they knew neither decay nor death they had to be housed in such constructions that were relatively more permanent. If this was the case with the gods and goddesses, it was almost the same with those who served and worked for them and came to be known as godly heroes. And since men were mere mortals, there was no point in housing them in structures that would outlive them in time.

This is an idea that seems to have been a later development in Indian thought, and may perhaps explain the absence of secular building activities in later times in relatively more permanent materials of brick and stone. But we know from literary and even archaeological sources, mainly from early Buddhist and Jain reliefs, that even in early historical times human dwellings were made of impermanent materials like mud, straw, bamboo, reed etc. Richer constructions were of wood and sometimes of brick; rarely was stone used for such edifices. That such was the case all over the Orient, can be postulated from what the Nepalese, the Burmese, the Thais and the Malayalese, for example, did in building their royal palaces even up to the early 19th century.

In earlier times, however, that is, before stone was introduced in India for purposes of sculpture and architecture, building materials were mud, straw, reed, bamboo etc. for humbler houses, and wood and presumably sun-dried or burnt brick for more wealthy ones, not only for secular purposes but also for religious. There is ample evidence in early rock-out Buddhist *chaityas*, *vihāras* and *stūpas* of the use of wood in earlier edifices of this kind. A good few of the elements of early Indian architecture, namely, railings, beams, pillars, rafters etc. were directly translated from wooden pre-types in terms of stone. Even some of the architectural types and forms, namely, of the gateways, *chaitya* façades etc. were translated from wood into stone. It, therefore, stands to reason that before the days of the Mauryas, Indian building activities, whether religious or secular (i.e., civil and military), were in wood and other impermanent or semi-permanent materials. Of such edifices and their forms and methods of construction there is enough evidence in early Buddhist and Jain reliefs, which can be supplemented by the large corpus of materials scattered in early Buddhist literature, in the Epics and the Purāṇas, in purely literary texts and in technical treatises on *Vāstuvidyā*, and also in such texts as the grammar of Pāṇini, the *Arthaśāstra* of Kauṭilya and the *Kāmasūtra* of Vātsyāyana.*

Even from very early times, some of the centres of human habitation in India seem to have become important for purposes of cross-country and international trade and commerce, or as coastal ports and inland market-places, or for purposes of administration. In such places there grew up flourishing cities that fulfilled the demands and requirements of the rich mercantile classes, the nobility and the aristocracy. But on the whole India of the early historical period retained its rural agricultural character not only in economy but also in its social pattern and ideology, and even her cities bore its impress in form, character and content. Indeed, roads, buildings, quaters etc. in the cities were nothing but elaborations of what existed in the villages; only the building materials, decorations and embellishments were richer and more elaborate, more complex and varied. Whatever other differences existed in the cities can be explained by reason of official and military administration or concentration of wealth for reasons of trade and commerce and for the service of comparatively wealthier citizens.

Therefore, whether we are thinking of rich city dwellings or fortifications or of humbler village structures of ancient India, a correct and adequate understanding of what may be called traditional architectural types and forms and their methods of construction is an essential pre-requisite. Yet, we know that these types and forms have not come down to us in extant remains. We are, therefore, left to reconstruct them from literary descriptions. But a more precise knowledge can be acquired from the positive evidence of archaeology, in other words, from such types, forms and shapes as one finds on the long series of narrative bas-reliefs of early Buddhist and Jain monuments as well as from extant remains of such monuments as, we know, were more or less adaptations for religious purposes from ordinary secular constructions.

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* A word of explanation is necessary for not including in our subject of study any discussion of the building activities of the pre-historic Indus valley. It is well-known that remains of elaborately planned and executed cities with one and more storeyed buildings of sun-dried brick, flanking both sides of wide or narrow streets cutting at right angles and provided with pipes for draining rain water from the terraces and the floors, with underground sewage built of corbelled arches, with public and private baths, market places, granaries and also presumably places for public worship, have been laid bare with the help of the archaeologists' spade in course of the last forty years at Mohenjodaro, Harappa and other cognate sites of the Indus valley and even farther east and south. But it is also generally recognised that the chalcolithic civilisation of the Indus valley is still a marginal chapter of Indian history and civilisation, and cannot be very closely connected along the arrow line of time and in their essential character, with the history and civilisation of India of historical times. For all that we know from recent exacavations in the Indus valley, the ruined cities of Harappa, Mohenjodaro and other sites, seem to have been reared up and fostered by a class-structured economy sustained by trade and commerce and a social pattern highly rich and sophisticated in the material basis of civilisation. The civilisation itself seems to have been highly conventionl in character reflecting its final stages after a life of centuries if not of millenniums. Its formal and ideological kinship is more with the civilisation that flourished on the shores of the eastern Mediterranean and in the valleys of the Tigris and the Euphrates than with the socio-economic pattern of ancient India, which was mainly rural and agricultural in character, at any rate from about *c.* 600 B.C. to a very comparatively late period.

But, before one sets out to attempt such a reconstruction of early Indian secular architecture, it is very necessary, we think, to have at least a rough idea of what we have been referring to as traditional architectural types and forms. It is well-known that traditions die hard, especially so in India where the rural agricultural pattern of social economy persisted through centuries despite political upheavals and intimate contacts with contemporary civilisations of the world. Such patterns survive even today in those areas which are still the abodes of primitive indigenous tribes, where modern city-civilisation has not yet been able to make any considerable intrusion. The characteristic Indian bullock cart, for example, that used to ply along the streets of Harappa and Mohenjodaro, still retain the same shape and form, and this, even in such cities as Calcutta, Delhi, Bombay and Madras. This is only one of the many instances of such survivals of traditional forms. In areas where building materials still consist of mud, bamboo, reed, straw, wood etc., it is very natural that traditional forms, shapes and types would persist, since some of these, at any rate, were conditioned by the materials themselves. The relatively unchanging pattern, on the whole, of the social economy too, conditioned certain other forms and types; for example, the working shed of the blacksmith of the lean-to or wind-break type, the round-based and platformed storage house of corn of the village house-holder and the cattle-shed of the agriculturist are still of the same type and form as existed hundreds of years ago.

Understandably enough, therefore, such traditional types and forms can still be seen in the distant tribal and rural areas. In India acculturation has been a slow process which has helped many primitive types still to survive, sometimes even in their pristine primitivity. Men still live in houses and leafy shelters in which his distant forbears, centuries before, used to live, and their shapes, forms and types are still the same, a few of which we come across even on the early Buddhist reliefs. There is no doubt that they must have existed even in earlier times. The same remarks may apply, perhaps not so widely and emphatically, to the types and forms of houses in rural areas all over India of today.

It is not the purpose of this chapter to survey the whole area of Indian tribal and rural houses. All that is attempted in the following pages of this chapter is to take a rapid glance at the more important and significant house-types, picked up at random, of some of the more important tribes, with special reference to types and forms that we meet with in early literary descriptions or on the early narrative reliefs datable in the centuries immediately preceding and following the beginning of the Christian era. So far as house-types in rural areas are concerned we have to content ourselves with a random and rapid survey of villages in eastern India alone, obviously for the sake of convenience. Here too, our main point of interest is to emphasise those types and forms that we meet with in early Indian art and literature. It is well-known that there are essential differences in house-types and forms and in their construction between those of upper or north Indian villages on the one hand and east-Indian and south-Indian villages on the other, differences that are conditioned by climate, by the regional social and economic pattern as well as by the materials available and used in the respective areas. Such causes have also conditioned the difference in types and forms between rural houses in eastern India on the one hand and those of the sub-montane regions of the Himalayas on the other, for example.

II. Tribal Houses and Settlement Patterns

Chotanagpur is the home of a number of important primitive tribes of India, for example, of the Mundas, the Santhals, the Oraons, the Birhors, and the Kharias. The usual settlement patterns of the Mundas is amorphous and agglomerated, i.e., the houses of a given settlement are all huddled together in more or less disorganised manner, around a nucleus which is often called *ākhrā*, "an open space under some old wide spreading tree". Here in this *ākhrā* are held village festivals and assemblies and also public meetings. In certain places around clearings in forests, may sometimes be seen the survival of an older 'ring-fenced type' of settlement. Poorer Munda houses are thatched with a kind of grass called *savri* which is available locally in plenty, but the richer houses are supported by wooden posts, which are usually of *śāla* wood, also plentifully available in local jungles. The rafters too are made of wood. The richer houses are roofed with tile. The fastening rope is gathered from the fibre of a wild creeper, locally available, and sometimes from a kind of hemp called *giuri*. In certain areas the walls are made of split bamboos, but ususally they are mud-built. Nowhere are they pierced by windows.[2]

The Santhals also use the same materials for house construction, but their settlement pattern is mainly linear, and unlike other tribal village patterns, there is no nucleus.

The walls, made of mud or bamboo, are here too without windows but they are provided with holes. The survival of an older ring-fenced type is traceable here as well; indeed this survival appears in all the settlement patterns of agricultural communities of Chotanagpur. The thick mud walls of an average Santhal hut, are usually smeared with locally available ochre wash and are often decorated with vegetal and floral designs; the roofs are usually thatched with grass or straw or palm leaf.[3]

The Oraon "huts have walls of mud or of split bamboo and either sloping roof of burnt clay tiles or thatches of wild grass supported on posts, beams and rafters made mostly of *śāla* wood", all plentifully available in native jungles and waste lands, also because "those are much easier of transport and collection and as owing to the absence of dampness in the atmosphere of the plateau, these stand no risk of decomposition. To keep out the hot winds of a tropical summer, the Oraon builds his hut without windows, and to drain off the rain water that pours in torrents in the rainy months, he makes the roofs and thatches of his huts somewhat sloping."[4] The settlement pattern of the Oraon is similar to that of the Mundas and the Santhals.

The Birhors are usually divided into two groups: one, the Uthlu Birhors are still in the hunting and food-gathering stage, while the other, that is, the Jaghi Birhors, are settlers and agriculturists. Birhor settlements are small in size consisting of half-a-dozen huts. The huts of the Uthlus are nothing but leaf shelters, small or relatively large, which have the form of low triangular *kumbas*. The Jaghi huts are also made of branches and covered with leaf, but their walls are better, being made of branches plastered with mud or wholly of mud.[5]

The Kharias too, are divided into two groups, one, called Hill Kharias, whose settlements consist of about a dozen homesteads with their small rectangular huts, 'depressed' and with having little or no plinth. The roof, supported on *śāla* posts, consists of two sloping wooden frames covered with grass or paddy straw. Walls are made of logs of *śāla* wood planted in the ground and plastered with mud. The other group which is a settled and agricultural one, is called Dudh Kharias who build their houses in a more substantial manner in solid mud walls. Their settlement patterns, like that of the Oraons and the Mundas, is agglomerated, amorphous and nuclear.[6]

The Bhils are still at the hunting and collecting stage and very few of them are settled agriculturists. Their houses are of a very modest type made invariably of locally available materials. The roof supported on posts has an up-turned basket-like frame which is thatched over with grass and takes the shape of an umbrella.

The houses and settlement patterns of the wild Kharias of Dalbhum and hill Bhumijas of Orissa may also be considered in connection with tribal houses and settlement patterns in the Chotanagpur region.

The settlement patterns of the hill Bhumijas of Orissa, may be described as 'depressed' and any nuclear formation is hardly traceable. Their huts are generally rectangular in ground-plan, with sloping roofs thatched with grass and leaf. The walls are usually made of logs of wood planted vertically on ground and plastered with mud from inside. The typical wild Kharia huts are miserable shelters made of materials easily available in the locality. The ground-plan is invariably rectangular, and ordinarily the thatched roof of the hut is supported by light *śāla* logs. The sloping thatches of the roof covered in thick layers with dried grass or paddy straw, are joined at the top at an acute angle. The walls are made of vertical wooden logs planted in the ground and plastered with mud or mud mixed with cow-dung. In the marshy areas, the roof consists of reed-matting plastered with mud and is supported by wooden posts set at intervals. Some roofs are of a barrel shape instead of being slanting and angular.[7]

The most important primitive tribe in Central India is that of the Gonds, whose settlement pattern is of the agglomerated and amorphous type; but in such settlements the houses are not necessarily huddled round a nucleus. In typical Gond settlements, huts are all perched about on uplands over-looking the agricultural fields. Usually such huts are thatched and have sloping roofs with walls of bamboo matting plastered with mud. But in regions where the Gonds live in close proximity of the Hindus, they have adopted the mud house types of poorer Hindus.[8]

The Garo settlement pattern is amorphous and agglomerated and their houses are arranged more or less with some order around an open space of irregular shape, called *sara* or *atela*, and hence may be said to be semi-nuclear. The village dormitory called *nokpante* is located in the centre or at one end of the settlement, where guests are entertained or accommodated and village meetings are held. Outside the agglomeration of houses but included in the settlements there is a collection of smaller huts or granaries for storing paddy contained in large baskets made of bamboo. Garo houses are usually built on piles, or on steep incline, evidently for purposes of protection. Local bamboo, bamboo leaves, cane leaves, thatching grass etc. provide all the materials for Garo houses. Roofs are covered with thatch grass, bamboo leaves or cane leaves, and walls are made of bamboo matting. Besides, having one house in the village every Garo has another in his field built for the cultivating season. Such houses are called *borangs* and are built high up on the trees, evidently for purposes of protection from wild animals.[9]

The Nagas are classed into various groups of which the Angamis, the Semas, the Aos, the Lhotas and the Rengmas are the most important. The settlement patterns and the settlement sizes of the Nagas differ from group to group, the size varying usually from one hundred houses of the Sema villages to about 8 to 9 hundred houses of the Aos and the Kohima Nagas. Usually Naga settlements are all very compact, but while the Ao and the Lhota settlements are of the linear type, i.e., houses lined along on both sides of regular central streets, the Sema settlements are agglomerated and also amorphous, the houses being scattered and loose. From close observation it appears that the settlement pattern of those Nagas that are cultivators, is compact and linear, and that of those who are shifting cultivators, is agglomerated and amorphous. Every Naga settlement has a village dormitory called *morung* which is the best of all Naga houses and is usually located at the entrance of the village. The settlements are also usually fenced; the Sema settlements have even double fence, with a ditch in between. The Naga houses are not all uniformly built with the same materials, but whatever they are, they are all gathered from local sources. The Ao Nagas and the Lhota Nagas build their houses with bamboo and thatch grass. The walls are made of thin bamboo, split and pleated together; the floor is also made of bamboo similarly treated. Occasionally they also use palm-leaves where thatching grass is scarce. The Rengma Nagas use wooden posts, bamboos and thatch. Wooden planks and posts are also used by the Angamis, but the Semas use chiefly bamboos for the walls and thatch for the roofs. The Kacha Nagas and Kukis use bamboos and cane leaves where thatch is scarce. "So, too, the Kolyokengu who are able to obtain slate, use that either instead of thatch or eke out what thatch they can get. When it comes to building, we find the Angamis who have timber in plenty but little bamboo, use hewn planks to build with. The Semas with little timber, but plenty of bamboo in their country, use the latter".[10]

The Purums present a more civilised settlement pattern. Their houses are rectangular in plan, and in front of the house there is always a courtyard. The floor is made of beaten earth and the plinth is about one to two feet high from the level of the courtyard. The walls are made of a kind of reed not unoften plastered with mud. Better class Purum houses show unmistakable sign of Meithu influence, especially in the villages near the plains. They have also been influenced by the Manipuri villages of the valley. The more substantial houses are provided with four sloped roofs, spacious, open verandahs running all round and decorative carvings on the beams of wood which is locally obtained. This type of houses increases in number as one goes down to the flat countries.[11]

The Veddas of Ceylon have only in recent decades settled down to cultivation from their hunting and food-gathering stage when they used to live in natural caves and rocky hide-outs in wild forest regions. In the agricultural season they live in leaf-covered huts, but even then they often go out for hunting and gathering honey, when they live in rock shelters. Indeed, rock shelters or a kind of very rough shelters made of over-hanging branches of trees or a very simple construction of wind-break type or of a triangular tent-like shape, are the commonest dwellings of the Veddas. In constructed shelters, the materials used are palm-leaf, tree barks, grass etc.[12]

The Todas of Malabar happen to be one of the most important primitive tribes of the South. The downs and the table lands of the Nilgiris which are their abodes are densely wooden and are called *sholas*. Toda settlements are found mostly near about the *sholas*. The settlement pattern of the Todas is agglomerated and amorphous, and the Toda villages, called *mads*, are usually scattered about the hills. Each *mad* or village consists of small groups of huts which are mainly built with bamboos closely laid together, fastened with cane strips and covered with thatch or palm leaf, bettlenut leaf or coconut leaf, these trees growing abundantly in the slopes of the Nilgiris. Wood required for the huts come from *kundi*, *pag* and *pulli marams* (trees). The huts usually measure 10 feet high, 18 feet long and 9 feet broad. Usually each *mand* or homestead comprises about five huts, three of which are used as dwellings, one as a dairy and the other for sheltering cattle at night. The houses are rectangular and the roof which is supported on four upright pillars connected by cross-beams, is formed of ribs of bamboo and cane and takes a wagon-headed or half-barrel shape. There are no windows and the rectangular door-ways are so small that one has to crawl through to enter the house.[13]

The Chenchus of Hyderabad can be divided into two groups. One group lives in the jungly and hilly areas of the higher ranges of the Amrabad plateau. They are still in the primitive hunting and food-gathering stage. Usually the settlements of this group of Chenchus consist of seven or eight houses, and generally only the kin groups inhabit these small settlements which consist mostly of temporary grass-huts and leaf-shelters. The other group called village Chenchus, is more permanently settled. In the Chenchu villages in the plains houses are built of solid mud with roofs thatched with grass. The roofs of houses of some of these village Chenchus have retained the traditional round shape and conical roof, but others are rectangular. The latter evidently reflect the influence exercised by the local Telegu peasant communities. But Chenchu villages on the plateau are more traditional in type. There are two distinct settlement patterns. In one pattern the houses are usually arranged in the form of a crescent, generally open to the east, and surrounded by trees. "The other type is found on the stretches of the naked rock, and the arrangement of the houses in this type of settlement is adopted to the surface of the rock formation. While the houses of these villages are generally built solidly with a circular mud wall and a conical thatched roof, a great variety of huts and shelters ranging from small roughly conical grass huts to one-sided leaf-shelters, are found in the temporary settlement."[14]

III. RURAL HOUSES AND SETTLEMENT PATTERNS

Nothing more than a rapid and sweeping survey of houses and settlement patterns of rural and purely agricultural India is possible here, nor is it perhaps necessary. All that need be done for our purpose is to take a rapid glance at the shapes, forms, materials and techniques of the houses and of the village-patterns of those zones and regions alone where the traditional rural character has still been maintained, somewhat relatively uninvaded by modes and methods of urban life and hence by modern building materials, constructional methods, forms and shapes.

Of all zones and regions in India, distant villages in Assam, Bengal and Orissa and in large segments of southern India and central Deccan have retained the traditional forms and patterns more than those of the Gangetic plains, Gujrat or the Punjab, for example. Yet, on the whole, in regions that lie far away from the cities traditional forms and patterns are still to be seen. As a general rule, houses in such places are built with locally available materials, permanent like stone or slate, semi-permanent like brick or tile, or transient like bamboo or wood. In fact, there is also a tendency to depend as much as possible, if not exclusively, on local materials. It is further noticed that the shape and form of the roof seem to depend, to a very great extent at any rate, on the amount of local rainfall and on the nature and character of the material itself. Thus, where rainfall is normal, moderate or heavy, the roof is generally sloped, whether made of thatch or tile or slate, but where rainfall is below normal e.g., in south Maratha and the Kanarese districts, western Uttar Pradesh and the Punjab the houses are usually flat-roofed whether made of tile or slate.

In Bihar the usual village pattern is linear but there are examples of amorphous and agglomerated patterns as well. In certain cases we have also mud-walled villages with a communal well situated outside the village wall. Even where the settlement pattern is linear, the homesteads are set in an orderly fashion. The houses themselves have sloped roofs of tile and mud walls. In certain parts of northern Bihar they have thatched roofs as well and in places where rainfall is very heavy, roofs are all very thickly thatched.

The orderly homestead plan of Bihar is however absent in the Uttar Pradesh. There the villages are compact and agglomerated. But the houses have almost invariably sloped roofs of tile and mud walls. In western

Uttar Pradesh, however, where the rainfall is low, the houses are generally flat-roofed, the roofs being covered with earth on planks laid horizontally. The walls are made of mud. The doors and windows are relatively small in size and some houses are absolutely without windows; in certain cases, the windows are latticed. Conditions in the Madhya Pradesh are more or less like those in eastern districts of the Uttar Pradesh. The ground plan is everywhere rectangular.

In the Kangra region of the Punjab houses are invariably rectangular in ground plan, and since rainfall is heavy, roofs are sloped and covered with thick layers of thatch. But in certain parts of Kangra both sloped and flat-roofed houses can be seen side by side. This can be explained probably by the intrusions of conditions that exist in other parts of the Punjab, where, since rainfall is scanty, houses are flat-roofed as in the western districts of the Uttar Pradesh. The walls are invariably of mud and hardly pierced by any window.

In the sub-Himalayan tracts and also in the Kulu valley and the Chamba region, where houses are built on the flat surfaces on the slopes of hills, the settlement pattern is amorphous and agglomerated, sometimes also very compact and without any enclosure walls. The roofs are invariably sloping, occasionally in pyramidal form in houses with more than one storey. The roof is made of tile or slate. Usually the walls are made of wooden planks very closely joined together, or of dressed stone.

In Gujrat and north Maharashtra houses are usually rectangular in plan with sloped tiled roofs, and the walls are made of mud and sometimes of local stone. In the southern parts of the Bombay state, however, where rainfall is low, houses have flat roofs of tile. The settlement pattern throughout Bombay and Gujrat is amorphous and agglomerated, but we have not many instances of walled villages.

In the Telugu speaking area, the settlement pattern is usually agglomerated, though amorphous. Along the coastal region, mostly among primitive tribes, the house-pattern is circular in ground plan and the roofs are thatched with grass or palm leaves, on frames of branches of trees or bamboo. In the plains too the houses are usually walled with mud, sometimes also with grass on bamboo frames, but the roofs are invariably rectangular. The houses are very simple, being built with bamboos and wooden posts, fragile walls made of leaves and grass on bamboo frames, and the roofs thatched with the same materials. Walls are more often than not plastered with mud.

In the Tamil speaking areas, however, walls are usually made of mud, but the roofs are tiled "laid two or three deep fixed with mortar having spines at regular intervals."[15] The ground plan is rectangular.

There are two Bengals, so to say, geographically, and somewhat culturally. Eastern Bengal, lying roughly to the east of the Bhagirathi and stretching as far east as the Surma valley, consists solely of low lying plains watered by wide rivers, washed by torrential rains and covered intermittently by wide fields of seasonal crops and high, thick and rich vegetation. Here, the homesteads are usually dispersed in the midst of the fields, or follow a linear settlement pattern along the banks of rivers. This is especially so in the *bhāṭi* or low lying regions in eastern Bengal where the settlements are arranged in a line or series of lines along the rivers or along the banks of *bils* (small lakes) or *hāors* (from *sāyar=sāgar*). In the *bhāṭi* regions of Mymensingh, Sylhet, Tippera and Dacca where, in the rainy season, high waters of the *hāors* dash in mighty waves against the village line, the villagers build strong bamboo fences (*postā*) to protect the houses from being eaten up by the water; the homestead plan also covers relatively a wider area than in Bihar and the Uttar Pradesh. Each family homestead consists of two or more isolated huts arranged on four sides of an open courtyard, the houses themselves being rectangular in plan and the roofs being usually sloped or curvilinear except, for instance, for the cattle-shed which is more of a wind-break or lean-to (locally called *ek-chāpḍā*) type. The poorer houses are generally built of bamboo, reed, thatch, grass, paddy straw etc. which are all locally available in plenty. The posts are usually of bamboo, but in richer houses, of wood. Walls are made of split and pleated bamboo woven into different patterns and designs. The sloping roof is almost invariably curvilinear in form due, no doubt, to heavy rainfall which along with high waters during the rainy season also condition high plinths. In the submontane districts of the Himalayas, we have also raised platforms due to the same reason on the one hand, and on the other, for protection from the ravages of wild animals and snakes. But in these regions the platforms are placed on wooden posts.

In Western Bengal, i.e., in the ancient Rāḍha country and in parts of northern Bengal where the rainfall is not so heavy as in eastern and southern Bengal, walls are usually made of mud, but the roofs are generally thatched with locally available grass, paddy straw or *hoglā*. Sometimes flat tile or barrel-shaped tile called *kholā*, is also used for roofing. In Howrah, Burdwan, Bankura, Birbhum and Midnapur districts it is not unusual to see two or even three-storeyed thatched houses with pyramidically curvilinear roofs and mud walls pierced by small windows that are placed at a considerably higher level than in eastern and southern Bengal. The convex curve of the thatched four-roofed houses in western Bengal tends sometimes to take a round shape. The homesteads themselves are also not infrequently protected by mud walls on all four sides and having a gate at the entrance side. Unlike eastern and southern Bengal the settlement pattern in western Bengal is amorphous and agglomerated.

The homestead plan and settlement pattern of the Surma and the Kamrup valleys in Assam are the same as in eastern Bengal. In Assam proper, that is, in the upper Brahmaputra valley, villages are very thinly scattered in amorphous settlements, but the house-type is more or less similar to that in east Bengal. But in certain areas the platforms are raised high on bamboo posts. Villages in Manipur are usually linear and compact, but those in the Kachhar districts are amorphous.

Since the main source of wealth and the pattern of living in eastern and western Bengal, Assam, Orissa and Bihar is agricultural, the isolated houses or homesteads as well as the physical composition of the village, are to a very large extent, determined by the needs and requirements of an agricultural life. The cattlehouse (*gośālā*), the granary (*golāghar*), the husking shed (*dheṅki-ghar*), the craftsmen's workshop (e.g., *kāmārśālā*) etc., are important components of a homestead. In richer houses a place of worship or *maṇḍapa*, and in the village, a community centre for public gathering, were also considered essential. Each homestead had also the need of at least one courtyard for pressing the harvested corn and drying them up. It was along the four sides of this yard that the different units of a homestead were generally organised. In richer houses, however, there were more yards than one, one inner and another outer courtyard, and sometimes even a third one in front of the house itself.

The settlement-pattern in Orissa, as in western Bengal, is amorphous and agglomerated. But in Puri and Cuttack districts there are certain settlements called *Brāhmaṇa-grāma* or *śāsanīya-grāma* which are of a linear pattern. The planning of the homestead is more or less the same as in Bengal. The houses are rectangular in ground plan and the sloping roofs are thatched with grass and straw; walls are built of mud and pierced by small windows on a relatively higher level. Throughout eastern India including Orissa, the roofs tend to take a curvilinear shape, sometimes coming very low and covering up the verandah in front of the house. There is no doubt that this was intended to keep the heat and the sun off as well as to prevent the slanting arrows of rain entering the inside or breaking against the walls.

IV. Relation of Tribal and Rural House-Types

From the above rapid and sweeping survey it is clear that both tribal and non-tribal rural houses in India are generally built with materials that are available locally, even if they are of poor and transient quality. The ground plan throughout India is predominently rectangular, and the roofs are sloping and angular, or curvilinear as in eastern India. Dwelling houses with round ground plan are found amongst the Chenchus of the lower Krishna valley and also along the coastal regions of the Telugu-speaking area. The granary houses of Bengal and Orissa are also similarly circular in ground plan. The roofs of the Chenchu houses are however conical, and convex curve of the thatch roofs of Bengali huts also take somewhat of a round form.

Generally speaking, village patterns in India are amorphous and agglomerated; they may also be called nuclear insofar as the settlements are grouped round the nucleus of a sacred tree or shrine or a community dancing ground or a well. A certain kind of survival or later development of the primitive ring-fence type of settlement can also be seen amongst certain settled agricultural tribes like the Santhals, the Oraons, the Mundas and the Garos. The linear and compact type of settlement is to be seen mostly in eastern India and Orissa, both in the tribal areas and rural agricultural areas.

Following Shapiro,[16] we may classify man-made houses in India that we have been speaking of, into three basic forms: (*a*) houses with a rectangular ground plan and with flat roofs; (*b*) houses with a circular ground plan and with roofs of the shape of a conical dome or a bee-hive, and (*c*) open shelters called lean-tos and wind-breaks.

We have seen that houses with rectangular ground plan are the most common in India. The reason is obvious. This plan allows more head-room and larger floor space and can be extended and enlarged according to increase in efficiency and technical skill. The roof may be flat with a slight slant to drain off water or it may also be of the form of a hood, that is, pitched, resting on the walls with the help of a series of rafters that meet at the ridge and project beyond the walls as eaves. This slope may be sharp or curvilinear, but the simple inclined roof is the commonest though the curvilinear type is also not infrequent.

In houses with rectangular ground plan, the roof and the walls are two separate units of construction, but in houses with a circular ground plan, at least in more primitive stages, the roof and the walls are one unit; the walls gradually or sharply sloping inward, go to make the wagon-headed or barrel-shaped or conical or semicircular roof. But at a later stage the roof and the walls seem to have become separated, the roof with overhanging eaves being made to rest on the walls by means of rafters. This is the stage that we find, for instance, in the *golāghars* or granary houses, or the dwelling houses with curvilinear roofs of rural Bengal, though in certain areas of north and east Bengal, rectangular granaries are also found. *Ghānighars* or oil-pressing houses in Contai (Midnapur district), the *Harisabhās* (public houses for devotional singing) in Manbhum and the *ghoṭuls* or the dormitories of the Murias in Bastar state, for example, are also circular in form. At least one form of Toda dairy is also circular, with a conical roof. The materials used for roofing are usually grass, paddy straw, mats, leaves, etc. The roof itself rests on simple bamboo posts and the walls are made of branches of trees, or of split bamboo matting, with or without mud plaster. Circular houses can be of various types: conical, bee-hive, domical, and semicircular, for instance, and all these types are to be met with in India.

Shelters of lean-to and wind-break type seem to have been the most primitive and widely distributed human abodes in India. A wind-break is the simplest structure of branches of trees struck into the ground and covered with grass, bark of trees, leaves etc., forming a wall, straight or semicircular, to prevent the direct beat of the wind. A lean-to is also similarly constructed, but the wall is raised from the ground with the help of upright posts and is slightly inclined to form a half-roof. It is evidently from such wind-breaks and lean-tos that the *ek-chāpḍā ghars* of Bihar and *ek-chālā-ghars* of Bengal have been evolved.

V. Logic of the Chapter

What has been attempted in this chapter may perhaps be considered somewhat uncalled for in a dissertation that seeks to base itself on archaeological materials. But since one of the objectives of the dissertation is to trace the origins of the settlement patterns and house-types as are furnished by archaeological evidence of the period under survey and to present them in their cultural and sociological context, it has been considered necessary to present in barest outline, the results of ethnological field-surveys in this field as a preface to the archaeological materials. We shall see later on as we proceed, that many of the patterns and types which we meet with on the early narrative reliefs of the Buddhists and Jains, have their pre-types, proto-types and cognates in those that have been described in this chapter. This would help us understand, it is believed, the background of the cultural tradition that finds expression in many of the house-types and forms of the centuries immediately before and after the beginning of the Christian era.

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CHAPTER TWO

GRĀMA-SANNIVEŚA

HAVING presented the results of field surveys in respect of tribal and rural settlement patterns and house-types and forms, an attempt may now be made to provide ourselves with a rapid historical background of our subject as furnished by materials drawn from literary sources and relating to villages, village-patterns and village units. Such an attempt may help us understand better and in their proper setting, the scanty architectural materials belonging to the period under review, and reconstruct in part that segment of early Indian life which produced the buildings under discussion and in which that life was lived.

I. THE PRE-VEDIC VILLAGE

The paleolithic man in India as elsewhere do not seem to have any built house. It is the early neolithic men who had to build shelters for themselves. The earliest types of such built houses were probably of the shape and form of what are usually known as lean-tos and wind-breaks.[1] At this stage of human civilisation the economic basis of material life was food-gathering and food-producing in one form or other. Social life was relatively loosely organised; dwelling houses were, therefore, more in the nature of makeshifts. It is only with the appearance of settled agriculture as the economic basis of subsistence of group life that we can really start to think of village-planning. The transition from hunting to domestication of animals and from food-gathering to food-production was, indeed, a very big change in the process of civilisation, which inevitably reflected itself in the building up of a community life within a frame-work of comparative economic security. Obviously, in those distant days, for one or more reasons, such groups were small and isolated from one another. Besides, one must also postulate a semi-permanent transitional stage between the migrant and temporary stage on the one hand, and settled and permanent stage on the other.[2]

The earliest village type in India that we can visualise is perhaps provided by the Andamanese village pattern. It is very significant that the Toda word for village is *mad* or *mand* which, according to Rivers, means "rather a 'place', a place connected in some way or other with the active life of the people."[3] It is, therefore, permissible to assume that a village originated in the active life of a group of people that needed for the sake of the economy that sustained them, a sort of permanent collective dwelling in more or less a given locality and more or less well demarcated. In the hunting and food-gathering stage this was hardly possible since the entire people in small groups of families or in small tribes, followed the track of animals they were out to kill or of food they were out to gather over large tracts of the country. But even at this stage, some sort of semi-permanent camps was necessary according to seasons of food and hunting centres. Each family of the tribe in such camps, occupied a regular place in the general lay out which were often on the plan of an ellipse; there they built their shelters and then they moved about in sort of a circuit. These shelter-huts all faced inwards towards an open space which was the dancing ground of the group. To the right of the main entrance to the camp was the bachelors' dormitory.[4] This description of a semi-permanent camp-village is what we find today in an average Andamanese village which may presumably be considered as the earliest example of *grāma-sanniveśa* in India.

This semi-permanent village pattern of the hunting and food-gathering stage, gradually gives way to settled and permanent village patterns under pressure of agricultural economy. But there are intermediate stages of shifting cultivation as well as of a kind of mixed economy based on this shifting cultivation on the one hand and seasonal hunting and food-gathering on the other. This stage of mixed economy is reflected in the village-pattern of the Veddas of Ceylon, the Chenchus of Hyderabad and the Birhors of Chotanagpur, for example. Seligmann's observation made about 40 years ago in respect of the village-patterns among the Veddas, show the gradual process of the evolution of early type of villages in India from the shifting stage to the more or less permanent stage.[5]

The pattern of permanent villages in pre-Vedic India can presumably be visualised from the settlement patterns of Naga cultivators of the Assam frontiers, and from those of the agricultural Garos, the Oraons, the Kharias and the Santhals, for example. In such villages the stage is already set for the village-pattern that we find described in Vedic and in early Buddhist literature which we are more directly concerned with for purpose of this dissertation. Already in these pre-Aryan permanent tribal settlements, we find groups of families subsisting on shifting and settled cultivation, some cottage crafts and cattle-rearing, and coming to live together in a given place, round a common courtyard or open space. Such villages consisted of several houses, each occupied by a family which was the unit, communal granaries, pasture grounds, public meeting places, bachelors' dormitories and sometimes even communal sheds for domesticated animals. Each house, consisting of one or two rooms, had a cooking corner and a separate cattle-shed, and sometimes also a working shed or workshop.

II. The Vedic Village

Already in the *Ṛig-Veda*, we find the Aryans settling down to a pastoral and agricultural village life.[6] Definite reference to clearing of forests[7] suggests that this was done for purpose of agriculture. That land was considered the main source of wealth is suggested by the use of such terms as *kshetrasa* which means gaining land, *kshetra jaya* or conquering land, *kshetrasya pati* or lord of land and *kshetrajesha* or acquisition of land, for example.[8] It also indicates that land was acquired not only by clearing of forests, but also from the conquered pre-Aryans. As in many other cases in the process of aryanisation, the Aryans presumably came to adopt themselves to the pre-Aryan village pattern. But in doing so they remoulded and remodelled it according to their social ideology of patriarchal family life and laws of inheritance based on the system of individual land tenure. The Vedic village or *grāma* was indeed an aggregate of several *kulas* or families;[9] each *kula*, lived in detached houses or *gṛihas* within a boundary or enclosure and was presided over by the father or the eldest brother of the family, called *kulapa* or *kulapati*.[10] Since individual system of ownership and inheritance of private property was recognised the house was demarcated by a boundary.[11] Macdonnel and Keith tell[12] us that the Vedic villages were apart from but close to one another and were connected by roads.[13] Each such village had a *grāmaṇī* or village headman[14] and each house of a family unit had its own cattle-shed and also perhaps a granary.[15] The village is regularly contrasted with the forest with its trees, plants and animals.[16] Most villages were probably open, but walled villages, more or less like a fort, were perhaps not unknown. Just outside and round a homestead land lay the belt of plough land which was owned separately by individual *kulas*, each ploughing his own individual plot or plots of land. Beyond the plough or *krishi* land, was the communal pasture-land, beyond which was the *aranya* where hermits, recluses and outcasts lived in poor and humble shelters.[17] As yet we have no evidence in Vedic literature of different and varied social and economic groups living in one village, since each single village was presumably inhabitated by a group of families[18] belonging to the same clan and following the same occupation which was mainly agricultural and pastoral in character. Conquered and subdued *dāsas* and *dasyus* who probably served as agricultural labourers and manual workers, used to live in separate village settlements of their own. Indeed, a sort of segregation of men and women following different crafts and belonging to different occupational groups living in separate villages, may have been operating even in pre-Vedic times amongst various occupational tribes settling down and forming into separate occupational villages.[19] It is permissible to conjecture that the Vedic Aryans had adopted, or were obliged to adopt this pattern of occupational villages, which was presumably reinforced by conquered *dāsas* and *dasyus* following different occupations and settling away from Aryan villages in separate village settlements of their own. Each Vedic Aryan village settlement seems to have had a public village assembly hall situated presumably in the centre of the village where villagers gathered for village festivities, ceremonies and discussions.

In the days of Pāṇini, the village boundaries were marked by their natural fortifications, such as forests, thickets (*kaṭhina*)[21], rivulets, hills, jungles[22] and *prastara*[23]. The peasant cottage[24] with their roofs made of reed and straw (*chādisheya triṇa*)[25] was the commonest type of house in the village[26]. *Vasati*[27] was the name of the entire settlement. As the villagers were mostly agriculturists, the area surrounding the village settlement consisted of arable land (*sītya*)[28], pasture (*gochara*)[29], plantation of bamboo thickets (*vaṁsa kaṭhina*)[30] etc. From the mention of reeds like *śara*[31] and forests of timber of *śiṁśipā*, *śamī*, *plaksha* and *mango* trees[32] etc., it is clear that building materials were available locally and in plenty.

III. Villages in the *Jātakas* and Early Buddhist Texts

It is in the *Jātakas* and in early Buddhist literature that we find for the first time a clearer picture of Indian village life and village patterns. Already by about 500 B.C., the Vedic *varṇa* had crystallised into the system of *jāti* or what is usually called caste. New castes had also come into being owing to the introduction of new crafts and industries. Graded in high and low categories, society had become more complex with the integration of more and more pre-Aryans and un-Aryans within the framework of Aryan society. New problems of social organisation, therefore, came to assert themselves. All these had their inevitable repercussions in all aspects of social organisation of which village organisation was only a segment, though an important one.

It is not, therefore, surprising that various types of villages are reflected in the *Jātakas* and in early Buddhist literature. By about the fifth century before Christ the major part of the habitable country, in north-eastern India at any rate, seems to have become covered with a net-work of villages. We hear of *gāmaka* or small village[33] as well as of *gāma*,[34] an ordinary village. We also read of *nigama gāmas*[35] which, from their descriptions, seem to have been villages which had grown up to the size and character of towns; evidently these were larger *gāmas* which may have amounted to *nigamas*. Frequent reference to the village-gate seems to indicate that at least some of the villages formed a compact self-centred homogenous unit.[36] This is perhaps echoed in the *smṛitis*, where emphasis is laid on every village having its precise boundary. If there is mention of *gāma-dvāra* there is also reference to a class of villages known as *dvāra-gāma* which presumably meant a village near the gate of a city or large town, in other words, a suburban village.[37] A certain village was situated at a distance of three *yojanas* from the capital town. Another order of village is referred to as *pachchanta gāma*, that is, frontier or border village,[38] which perhaps referred to those villages that were far away from the cities or larger villages. Some references seem to suggest that new villages were being established by large clearing of forests in regions where enough land was available.

From a number of descriptions it is clear that such *pachchanta* villages were stituated in rather insecure places where organised robberies and other sorts of depredations were not perhaps infrequent.[39] The economic life of such villages also were largely in a primitive stage since we find them pitching and shifting settlements wherever they could best find their food and shelter.[40]

An idea may be had of the size and population of an ordinary village from the fact that such a village consisted of anything from a group of two or three houses to an indefinite number, and from 30 to 1,000 families.[41] One village consisted of 500 families;[42] from other instances we know that the number of families usually varied from 150 to 5,000 families.[43]

The fields of the village or *gāma-khettas* lay outside the clustered dwellings of families, beyond which stretched *araṇya* or the forest, a description which is very much like what we read of in the Vedic texts.[44]

But socially and from the point of view of planning, the most interesting item of information is that there were villages which were occupied solely or mainly by people belonging to one or other specific community, specialising in some kind or other of the various arts and crafts or trade or industry. We have instances of villages of smiths, carpenters, potters, weavers, *chaṇḍālas*, *brāhmaṇas*, hunters etc.[45] We have mention of a fishing village of 1,000 families (*kulasahassa-vase kevatta gāma*)[46] and a smiths' village in the kingdom of Kāśī, of 1,000 houses.[47]

Banaras also offers the example of a village of architects (carpenters or masons), called *vaddhaki gāma*, with 500 families[48], and another village of salt manufacturers, *loṇakāra*[49]. The *Suvaṇṇakakkaṭa Jātaka* makes mention of a *brāhmaṇa* village. Such professional villages may presumably have grown out of the age-old practice of tribes following a particular profession or occupation forming into one unit and founding a settlement of their own. Or, it may also have been due to the natural tendency of localisation of a particular kind of craft, industry or profession. The existence and growth of *dvāra-gāmas* or suburban villages may have been due to the policy of segregation adopted by the higher castes with regard to people of despised castes like the *chaṇḍālas* and the *charmakāras*.

There is one specific reference to a *chaṇḍāla* village being situated outside the city of Ujjain.[50] It seems that every important village had a public hall of its own, which was the shelter for the stranded, and an inn for travellers.[51] The public hall served also as the centre for recreation for the villagers as well as for discussion of their community and religious affairs. It was also the place for the exercise of collective charity of the village. The *Susima*

Jātaka and *Kalpadruma Avadāna* refer to the charity of the people of Sāvatthī from the common *sabhā-griha*.

It seems that *gāmas* that were inhabited by persons following specific crafts, industries or professions exhibited a closer bond of cohesion and aggregation than those that were purely agricultural.

IV. VILLAGES IN JAIN CANONICAL TEXTS

The Jain *Brihat-Kalpasūtra Bhāshya*[52] is a veritable mine of information in respect of ancient Indian villages and their planning. The text[53] enumerates different types of villages, which may be described as follows. A village planned in a circle with the common village well as the central point, was called *uttana-mallakākāra* village which looked more or less like an open bowl.[54] The *avaṁmukha* type of village was one which was also circular in pattern.[55] But the centre of the circle was provided by a temple or a tree, the entire village looking more or less like an inverted bowl. A third type[56] was called *khaṇḍa*, which was more or less of the shape and form of a half-circle, and was perhaps, therefore, called a broken type. In this type the trees and the village well were situated on one side of the village. There was then a fourth type[57]. called *uttānaka-khaṇḍa-malla saṁsthita*, and yet a fifth[58] called *avaṁmukha sampuṭaka*. It is difficult to say exactly what these two last types meant in terms of village planning, though it seems that they were but variations of respectively the second and first types described above. The same text[59] refers also to other types of villages, namely, the *bhitti-saṁsthita* type which stood for villages planned along the boundary wall with parallel rows of trees planted in the east and the sides; *paṭalika*[60] or avenue type of village; *valabhi*[61] or villages with trees planted at the four corners; *ruchaka* or a type of village with uneven ground ringed with trees; and finally the *kāśyapa*[62] which was triangular in shape 'like a barber's razor'.

It appears from the same text that villages were classified according to other standpoints as well. For instance, a village around which no village or no pasture ground existed to the distance of two and half *gavyūtis* or seven *koshas*, was called a *maḍamba* village.[63] A mining village was called *ākara*[64]; a cow-herds' village was called *ghosha*[65]. *Saṁvāha*[66] was another type of village whence the farmers or traders having their business elsewhere, proceeded to hilly or some such difficult place and lived there. It has to be admitted however that the names of the various types of village and the basis for their classification, are not always sufficiently intelligible.

The plough lands of the village or *kheta* seem to have been enclosed with a mud wall (*dhūli prākāra*)[67]. It seems further that every fair-sized village had its own *bhāṇḍa-śālā* and *paṇita śālā*[68] where the potters made and sold their earthen works; a *kamma-śālā*[69] where the village smith plied his profession; and an *āgamana-griha*[70] where guests were provided with food and shelter. Also, every village seems to have been provided with a *sabhā-griha* in the centre of the village (*maddhama goshṭha*)[71], with a covered watershed or *prapā*[72], and perhaps also with a *devakula*[73] or temple. The commentary of the *Āchārāṅga sūtra* states that the *sabhā-griha* served also as the rest house.

Villages were provided with various types of grain storage. A most common type of a grain store-house was made by piling straw rings on the bare floor and plastering the outer and inner surfaces with mud and cow-dung.[75] Another type was made of bamboo and straw but raised on a platform or *mañcha* resting on bamboo posts.[76] Grain store-houses were called *chatuḥ-śālā, avaparaka, koshṭhaka, koshṭha-palla*[77], etc. Some of them were evidently made of mud and some presumably of brick.[78]

The limit of a village is once described as the distance to which the cattle go for grazing;[79] at another place, a village is said to be limited by the distance a wood-cutter can go to fetch his wood;[80] still at another place in the same *Brihat-Kalpasūtra-Bhāshya*, each village is said to have its own boundaries.[81]

V. VILLAGE PLANNING TRADITION

The pattern of an average village as reflected in early Buddhist texts, became practically the traditional pattern of the Indian village during later centuries. Not only that *gāmas* and *gāmakas*, i.e., ordinary villages and small villages, *nigama gāmas* and market villages, villages of smiths, of hunters, of carpenters, of fishermen as well as of *brāhmaṇas, śūdras* and *chaṇḍālas* etc., according to the social stratification inherent in the system of caste, came generally to be accepted, but the general planning of the village including its roads, pastorage, communal hall, place of worship etc. also continued to be the same. In large villages where different occupational and professional castes congregated, the above segregation and stratification were nevertheless adopted and on much the same principle of division of labour and caste grouping. This is how the different *paḍrakas* or *pāḍās* (quarters) of a large village came into existence, each *pāḍā* consisting usually of people belonging to the same caste or profession. There can be no doubt that strong economic factors lay at the bottom of the transition from the primitive and tribal collective villages to the village aggregates of historical times.

The general attitude towards villages and village-life that we find reflected in early Buddhist texts, seems to have undergone considerable change from about the beginning of the Christian era. Already in the centuries immediately preceding, the *śreshṭhīs*, the *sārthavāhas* and the *kulikas*, all organised in powerful guilds, were coming into prominence in the socio-economic and political life of the country. Market towns and small and large emporiums of trade and commerce were slowly growing up. Localisation and specialisation of certain crafts and industries as well as the development of partnership and joint-stock companies among traders, bankers and artisans were also helping the growth of small and big towns, often walled and fortified for purpose of security. Indeed, what was already a social phenomena of some importance came to receive a great impetus when increasing trade activities with the western world in post-Christian centuries changed the entire character of Indian trade and commerce and of crafts and industries. Naturally, this change was reflected most in the growth of towns, big and small, and villages seem to have been relegated somewhat into the background of social life, since they came to serve mainly as production centres of food, i.e., as purely agricultural centres. The relatively unimportant position of villages in contemporary social economy is very strikingly reflected in atleast two important texts, namely the *Arthaśāstra* of Kauṭilya and the *Kāmasūtra* of Vātsyāyana, an analysis of which leaves no room for doubt that villages were subjected more and more to the economic and political exploitation by the towns. Kauṭilya states that a village should consist of not less than a hundred families and not more than 5,000 families of agricultural people of the *śūdra* caste.[82] The *Mārkaṇḍeya Purāṇa* also seems to indicate that a village should consist of *śūdras* alone who belong to the peasant caste.[83] Yet, there was a time when cities and city-dwellers were held in derision. Indeed, the *Baudhāyana Dharmasūtra*[84] (II. 3, 6, 33) says, "It is impossible for one to obtain salvation, who lives in a town covered with dust." It may be pointed out that the tradition as recorded in the *Dharmasūtras* is contemporaneous with what is recorded in early Pali canonical texts.

Kauṭilya further says that no guilds of any kind other than local co-operative guilds should find a place in the village. He recommends that in the villages there should be no *śālās* or buildings intended for sports and plays. He also recommends that the king should construct villages either on new sites or on old ones and people them by inducing foreigners to immigrate there or by diverting the surplus population of crowded centres. It appears that in his opinion the justification of the existence of villages lay primarily in feeding and supporting the towns.[85] Vātsyāyana's attitude seems to have been similar if not more inclined in favour of towns and cities. With him the ideal life was the life of the *nāgaraka* and the only place worth living in was the *nagara*. Undisguisedly he laughs at villagers and holds rural people and culture in derision. This is more or less the attitude also of the *Purāṇas* and the *Śilpaśāstras*. While there is in almost every *Purāṇa* and *Śilpaśāstra* text a chapter on *nagara-vinyāsa* and *nagara-lakshaṇas*, there is no chapter on *grāma-vinyāsa* or *grāma-lakshaṇas* which evidently was considered as only of minor importance. While *prāsadas* and *devālayas* and *durgas* occupy much of the attention of the writers of such texts there is hardly any reference to the humbler dwelling houses of ordinary individuals. Nor such dwellings find any notable mention in contemporary literary texts including the works of *Kalidāsa* and the final redactions of the Epics. The humbler *manushyālayas* or human dwellings that are often alluded to and described, are the *tapovanas* or hermitages, *brahma-somāraṇyas* or forest retreats and places of pilgrimages etc; but they were obviously meant for brahmins, recluses and ascetics. Even in the chapters on *nagara-vinyāsa* more and more attention is paid to the location and construction of temples and palaces, and less and less to the planning and construction of dwelling of the humbler people. Even the division and classification of villages in such texts as the *Mānasāra* concern themselves more with abstract ideas than with actual concrete village-planning.

VI. CONTINUITY OF THE VILLAGE-PLANNING TRADITION

Towards the end of the so-called Hindu period there was an increasing dwindling of Indian trade and maritime activities. Cut off from the western markets as well as from the Chinese and the Central Asian, India north of the Vindhyas, at any rate, ceased to draw gold from outside. The only territories with which she had trade and commercial relations were the Himalayan countries of Bhutan, Nepal, Tibet, Kashmir, and the islands and the peninsular countries of Burma, Siam, Indo-China and Indonesia. But, it seems, this trade did not give north India any rich balance. The whole of northern India thus seems to have fallen back purely on her rural agricultural economy. This shift in social economy necessarily led to the transference of emphasis from towns and cities to villages. Three centuries and more of unsettled political and economic life during the Sultanate period only helped to underline and hasten the process. With Akbar on the throne of Delhi political stability came back to north India and a new lease of life was given to Indian trade and commercial activities which helped, to an extent, the growth of new towns, cities and emporia of trade. But the villages with their self-sufficient agricultural economy continued to be the main centres of the larger social and economic life of the people. Whatever the picture furnished by dynastic chronicles, court records and accounts of foreign sojourners and merchantmen, villages undoubtedly were the backbone of Indian society throughout the late mediaeval period, as a matter of that, up to the beginning of the twentieth century. Mediaeval vernacular literature of north India especially of north-eastern India comprising Bihar, Bengal, Orissa and Assam, bears clear testimony to this main tenor of Indian socio-economic life.

One may cite mediaeval Bengali literature as a source of information. Here, in the longer narrative *kāvyas* like the *Chaṇḍi-maṅgala* of Mukundarām, the *Manasāmaṅgal kāvyas* by various authors and other biographical *kāvyas*, for example, one finds a clear picture of life that was centred in the villages despite more or less brisk trade and commercial activities often alluded to. In such texts not only does one find clear descriptions of how village dwellings were built, but also occasional descriptions of how villages were planned. Curiously enough such descriptions applied also to towns, that is, the general principles of both village and town planning seem to have been the same, and the conclusion becomes irresistible that towns were nothing but amplified villages, only somewhat richer, more elaborate and sumptuous. This is exactly what we find also not only in early Buddhist literature, but also in such early Brahmanical texts as *Jaiminīya Upanishad Brāhmaṇa* where it is stated that the *grāma* sometimes grew into a *mahāgrāma* and necessarily into a town or city where naturally people congregated for purposes of security and protection as well as for wider transaction of goods produced.[87]

The descriptions of villages consisting of different *pāḍās* or quarters inhabited by particular castes, professional, occupational or tribal, in mediaeval Bengali texts, also reflect very much the same conditions as alluded to in early Buddhist texts. The lowest and the despised castes who were more or less untouchables, used to live in the outskirts of the average village, much as they used to do in the days reflected in the *Jātakas*. Occasionally one reads of the establishment of new settlements of villages after clearing of forests. Relatively richer villages had schools, temples, communal meeting houses for social and religious festivals, pasture lands etc.,[88] which were common properties of any given village. Easy and widely current proverbs giving laconic descriptions of villages and house-planning also seem to have become very much popular with our mediaeval authors. One such proverb[89] gives a picturesque description of the general plan of an average household: to the east will be the tank, and to the west the bamboo groves, (i.e., any small jungle area that usually supply timber and firewood and bamboo for an average homestead), to the north must be the garden, and the south shall be entirely open. Here is thus a definite idea about the planning of an average homestead and this idea was neither geometrical nor abstract in any sense. Descriptions of household patterns are also available. A relatively substantial family-dwelling consisted of two apartments, both arranged on four sides of an open courtyard (*chatuḥśālā*). The outer apartment had an open or walled public house, a guest house, a *maṇḍapa* for religious purposes, hay stacks and cattle-sheds. The inner apartment which was usually the domain of the women-folk, consisted of bedrooms for the inmates, the kitchen, a paddy-husking shed and a vegetable garden. This plan of an average house-hold served very well till the end of the 19th century. But the majority of the houses were much poorer and consisted of one or two huts very poorly built, especially in the quarters where lived the lower and despised castes. In the houses of the craftsmen of the village, however, as for example, of the carpenters, weavers, black-smiths etc., there was also a shed which was used as a workshop.

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Chapter Three

GṚIHA-VINYĀSA

Having discussed some of the principles of tribal and rural village planning of today and those of bygone times, we may now proceed to the description and analysis of the evidence of homestead plans, types and forms of houses as furnished by literature and archaeology, that can be generally referred to the period of our survey, that is, from *circa* 150 B.C. to *circa* 350 A.D. The two earlier chapters aimed at showing a general continuity of the tradition of village-planning and house-building from the earliest to more recent times. The present chapter is designed to aim at showing the continuity of the tradition of planning of homesteads as well as of the various types and forms of houses that are generally met with in the villages. This is purported to be done by an analysis of the references to homestead plans in literature and of the representations of various house-types and forms in early Indian relief sculptures. An attempt will be made in this connection to relate such plans, types and forms with those that are still to be found in the different tribal settlements and in the village areas of contemporary India.

Since this chapter would deal with early Indian architectural activities in humbler materials and as generally confined to rural areas, we have chosen to describe the constructions as mere *gṛihas* as distinguished from *prāsādas* which are usually to be found in the cities. Nothing more than this is sought to be conveyed through the phrase *gṛiha-vinyāsa* as against the phrase *prāsāda-vinyāsa.*

In respect of average homesteads and their general plans, early Buddhist and Jain texts, especially the Buddhist *Jātaka* stories, have some material information to offer. Percy Brown has attempted to reconstruct the plan and set-up of an average village of the later Vedic period,[1] but such reconstruction is evidently conjectural and somewhat imaginative. It is, therefore, safer to depend on evidence that can more definitely be assigned to a given time and space and be derived from archaeological materials. The *Jātaka* stories give us a more or less detailed picture of the set-up of the one or more houses that constituted a homestead and also the different purposes for which they were used. Single-cell hermitages made of locally available materials like leaves, *kuśa* grass, branches of trees etc., are frequently mentioned.[2] It can also be deduced that the common homestead of the poorer sections of the people consisted of a single wattle and daub hut with roof made of thatch and walls, of branches of trees and grass.[3] But more substantial homesteads with more than one house are also mentioned. For example, in the *Devadhamma Jātaka*, we are told that the Bodhisattva caused to be built for himself a chamber to live in, a room for the fire and a store room.[4] In the *Indiya Jātaka* it is said that the back-room was used for the kitchen.[5] This back-room for the kitchen and the shed for cattle or the workshop mentioned in both early Pali and Sanskrit literature, does not find any representation in early Indian reliefs, but it is quite likely that their shape and form were those of the wind-break or lean-to or *ek-chapḍā* type of construction that is so frequent amongst the tribal peoples and the villages of contemporary India. Mention of granaries along with dwelling houses is found in a number of *Jātakas*.[6] In certain stories granaries are said to be located on raised platforms inside the main house,[7] a practice which is quite common in many villages in eastern India of today. In certain other *Jātakas* the hut of the field watcher finds mention[8], a feature which is still common in our villages, the hut being raised on a high platform resting on four or six bamboo posts, and roofed over with thatch or grass. Some of the homesteads were provided with two entrances, as for instance, in the *Kuruṅga-miga Jātaka*, we find it stated that in a particular house entrance was effected by the front door and the exit by the back.[9]

The *Chullavagga* and the *Mahāvagga* furnish us with elaborate descriptions of houses comprising a homestead. Evidently such houses were owned and used by the wealthier sections of the people. According to the *Chullavagga*, a house consisted of dwelling rooms, retiring rooms, store rooms, service halls, halls with fire places, closets and cloisters, bath rooms, halls for exercise, walls and sheds for the wells, ponds, open-roof sheds or *maṇḍapas* etc.[10] The *Mahāvagga* refers to an *upāsaka* or lay disciple who built for his own use a living room, a sleeping room, a stable, a tower, a peaked building, a shop, a storeyed house, an attic, a cave, a cell, a store-room, a refractory, a fire room, a kitchen, a privy, a well, a well-house, and a *yantra-gṛiha* among others.[11] The *Chullavagga* again tells us that the inner chamber of a house was sometimes divided into more than one section, namely *śivikā-garbha* or small halls and *harmya-garbha* which appear to be large halls.

The some text refers to the Blessed One as having once said, "I allow you, oh Bhikkhus, covered terraces, inner verandahs and over-hanging eaves."[12] From the above references it is permissible to assume that such elaborate homesteads could not have been very common in villages; in fact, from the representations on early Indian reliefs it appears that they were quite common in the cities.

The evidence of early Buddhist literature finds indirect support from earlier Vedic literature. From scattered references we know that a Vedic dwelling house was known as *āgāra* or *gṛiha*[13], the last word denoting also a shed for cattle. A homestead is said to have been composed of several rooms that could be securely shut up.[14] They were supposed to consist of, in addition to other rooms, a *havirdhāna*, an *agnisālā*, a *sadana* or apartment for women, a store house and a granary, a kitchen, an apartment for guests and visitors, a cattle-shed and an aviary.[15] The entire house was to be surrounded by a wall.[16] If the householder happened to be an artisan, the homestead contained also an additional workshop, which was presumably the *āvesana sippa-sāla* of the Pāli text. The guest house as an apartment of the homestead is perhaps also referred to in the *Atharva Veda*, but the meaning of the word used in this connection (*āvasatha*) is not very clear.[17]

According to Pāṇini villages were marked out by their natural boundaries, such as forests, thickets, rivers, rivulets and hills, etc.[18] Kauṭilya in his *Arthaśāstra* says that the villages were full of cottages as they are even today.[19] In his opinion each house should have an *anidvāra* or gateway and a boundary wall.[20] Windows were small and had to be raised high up on the wall,[21] a feature that finds corroboration from representations on early Indian reliefs.

By far the larger number of references to secular buildings in early Pāli literature, which early Indian reliefs happen to be the visible presentations of, seem to relate themselves to relatively the richer and more elaborate buildings in the cities. Nevertheless these reliefs represent a number of humbler dwellings as well, referred to in most cases as *parṇaśālās* or dwelling huts made of leaves or thatch, bamboo, reeds, etc.[22] It is somewhat strange that in certain cases they are set in the context of cities as well. Somewhat more substantial buildings built of bamboo, reed, thatch etc., but more extensively of wood and in certain cases of tiles and bricks, are also to be met with in the representations on early Indian relief sculptures, and this in the context of villages.

The rock-cut Sudama and the Lomaṣa Rishi caves in the Barabar hills of Gaya (cf. figs. 72, 73, 75) introduce us for the first time with the more important types of what one can safely associate with the humbler dwellings in villages. The Sudāmā is a lithic translation of a type of contemporary construction in mud, wood, bamboo and thatch. Its four inclined walls have a thickness which suggest that its pre-type consisted of walls of mud, through the entrance side of which was pierced a door with inclined sides. The mud walls seem to have been reinforced on the outside by vertically set wooden planks, presumably for additional protection from the rigours of weather. The building was provided with a curvilinear roof made of thatch, placed presumably on a bamboo frame and with overhanging eaves. This type of house construction can still be seen in many parts of eastern India and is quite frequent even today in the villages of Bengal. Typical mile-stones of this type can be pointed out, for example, in the Draupadī Ratha of Mamallapuram of about the seventh century A.D. and in the Mughal and the Rajput balcony constructions of mediaeval India (*Eastern Art*, Vol. III, 1931, plate cII, figs. 34, 37, 38, 39, for example). This is also the type which came to be known by the anglicised term *bungalow*, perhaps reminiscent of the fact that the type originated in Bengal. One of the early archaeological pre-types almost contemporaneous with the Sudama, is furnished by the representation of two curvilinear houses represented on the Sohagaura Copper Plate (fig. 77).

The Lomasa Rishi is also a lithic translation of a pre-type of construction of wood, bamboo, reed, leaf and thatch etc., with a rectangular base, but with a roof of a somewhat wagon headed or barrel shape and form and with inclined walls on all sides. The entrance side was pierced by a rectangular door with inclined sides and a gabled window between the door and the roof and following the lines of the roof as closely as possible. There can hardly be any doubt that the original pre-type of this window was made of bamboo which was later translated in terms of wood with increasingly more and more elaboration and embellishment until it came to take the shape and form of what is called the *gavāksha* or the so-called horse-shoe window. The different stages of the evolution of this particular pattern can be seen in the long series of the *chaitya* caves of western India, and have been very ably traced and analysed by Coomaraswamy.

That this type of rectangular construction with a somewhat barrel-vaulted roof and inclined walls originated from the typical hut type associated with the Todas of the Nilgiri hills is no longer doubted. Macdonell and Keith,[23] and following them, Percy Brown,[24] appear to suggest that the huts of the Vedic Aryans were more or less of this type, which may or may not have been the case. The evolved form of the Lomasa Rishi cave can be seen, for example, in many representations on early Indian reliefs, on a terracotta plaque from Bhita (fig. 67), and as late as in the Bhima Ratha at Mamallapuram of the seventh century A.D, for example.

From an analysis of the humbler abodes as represented on early Indian reliefs, it is possible to reduce them mainly to four types:

I. Those with a circular ground plan and somewhat conically round roof. In certain cases the roof was crowned at the top centre by a finial from the shape and form of which it seems that the finials were made of wood, or at least translated in terms of wood from straw and thatch which were the usual materials, so far as this particular type was concerned, for the roof (cf. figs. 7, 8, 10 right, 11, 12, 13, for example).

II. Those the ground plan of which was rectangular and the roofs of which were either wagon-headed or barrel-shaped, or purely semi-curcular (cf. figs. 10 left, 23, 24, 26, 28, 72, for example). In certain cases of this type the roof had an apsidal end, almost exactly of the kind as one sees in the rock-cut *chaitya*-halls (cf. fig. 22, for example). Still in other cases one can detect a double roof, the upper one placed on a truncated lower one (cf. fig. 25). Such retangular constructions with similar double roofs of curvilinear shape is a characteristic feature of a particular type of contemporary village dwellings of Bengal (cf. fig. 99, 100, 101, for example).

III. Those that had a square or rectangular ground-plan and were provided with curvilinear roof, with a finial at the top (cf. figs. 1, 2, 3, 4, 5, 6, 9, 13, 14, 15, 17, for example). In certain cases of this type, the roof acquires a decorative pattern like that of the shape of an umbrella or often inverted lotus flower, or inverted bell (cf. figs. 17, 18, for example).

IV. There is a fourth type of humbler dwelling, (fig. 29, for example) which was not perhaps very common, insofar as the representations on the reliefs are concerned. We have one such example represented on a relief panel of Sanchi, which seems to be a square or rectangular construction with straight walls on four sides and covered over with a tiled roof with straight sloping sides, meeting at the top and serving as the spine as if it were, the spine being covered with another layer of tiles.[25] This type of house construction, especially roof construction with tiles, is very frequent in the villages of Bihar and Uttar Pradesh of today, and is perhaps the pre-type of rectangular houses with corrugated iron roofing in the villages of contemporary eastern Bengal. The traditional slate roofing or roofing with wooden planks of houses in the sub-Himalayan regions of India also belong to this type. Such constructions with two straight sloping roofs meeting at the top at acute angles, but built of thatch placed on bamboo frames, are frequently met with in many parts of India including Bengal. It may perhaps be assumed that this type of sloping roof construction, grew out of the wind-break or lean-to type (fig. 86). Since, speaking from the point of view of construction, the type is nothing but a duplication, back to back, of a wind-break, the joining at the apex of the angle being tied and then covered with thatch. That this is so will be evident from the market houses in any average village market, where wind-breaks or lean-tos of one line of shops are placed back to back with those of another line. The evolved form and type of such rectangular houses with two slanting roofs of thatch, straw or leaves or tiles meeting at angles at the top, may be seen in the house patterns of the Oraons and the Nagas, for example (cf. figs. 82, 87).

Of more or less complete homesteads, we have a couple of representations in the early Buddhist narrative reliefs belonging to the period under review. The Barhut representation of the *Gahapati Jātaka* (fig. 23) shows two rectangular barrel-roofed houses which seem to belong to one and the same homestead and were presumably used for living purposes. The representation of the *Kapota Jātaka* (fig. 24), also at Barhut, shows two constructions belonging presumably to the same homestead, both having a rectangular base and a semi-circular roof. In the representation of the *Losaka Jātaka* (fig. 10) at Amaravati, we have two constructions, both built on a raised platform protected by a brick wall. Of the two constructions one has a rectangular ground plan and is provided with barrel-shaped roof presumably of thatch placed on a bamboo frame work. Adjacent to this is another construction with a circular ground plan and covered by an almost hemispherical roof built of leaves arranged in circular rows. The latter seems presumably to have been the granary, while the former was perhaps the living room. A similar homestead plan can be seen in the representation of the story of Kavikumāra at Amaravati, which shows an exactly similar rectangular house with a barrel-shaped roof, and another with a circular ground plan and a somewhat conically hemispherical roof made of large leaves cut to size (fig. 12). The circular construction has the usual shape and form of a granary, but from the fact that it is provided with a rectangular door on the entrance side, it is not unlikely that such buildings were used for dwelling purposes. The representation of the village of Uruvilva at Sanchi (fig. 71) also shows a more or less similar homestead composition with two types of houses, one rectangular with a wagon-headed roof and another circular with a hemispherical roof, serving presumably the purpose of dwelling and storing of grains respectively.

The first type described above is referred to in early Pali literature and represented in the early Indian reliefs as abodes of hermits. But there can hardly be any doubt that the type originated from the very humble dwellings of certain primitive tribes of Tamil speaking areas along the eastern coast line. An ordinary hut of the Irlas (fig. 92), for instance, has a purely round base and is covered over with a conically round roof made of thatch or grass or palm or coconut leaf. The walls are made of reed, bamboo, branches of trees etc., and plastered over with mud. The same type, somewhat of a more stunted appearance, is to be met with amongst another primitive tribe in the Waltair district of the Andhra State (fig. 90). In some of the houses the top of the cone is decorated with a finial, very much like the one we have in the representations on early Indian reliefs. The close similarity of the type represented on early Indian reliefs with that of the primitive tribes just referred to, will be evident from a comparison of figures 10 right, 11, 12 and 74, for example. So far as the sculptured representations are concerned, the houses of this type are relatively higher in proportion and are more finished in appearence, but the family likeness is unmistakable. In certain cases the conically round roof is rendered hemispherically which is presumably nothing more than an adaptation of the original form. The symmetrical arrangement of the leaves on the roof, the walls of neatly pleated bamboo, the straight rectangular doors, and the windows of various shapes and forms, with or without vertical bars, in sculptured examples, can be explained by the simple reason of their being carved in stone as decorative and narrative pieces.

The type seems to have persisted through centuries, though with more or less variations in detail. Throughout a large segment of India, especially of eastern India, villagers still build such round huts of small or large proportions, on low or raised platforms, with walls made of pleated bamboo or reed or of mud, and roofed over with thatch and straw. But they use them for storing grains (figs. 94, 96, 97, for example), not for purposes of dwelling or for any other purpose. Throughout north and eastern India, they are known as *golā ghars* or granaries. A modern brick-built example of such *golā ghars*, in huge proportion, can still be seen in the very heart of the city of Patna. It is easy to imagine that the royal grain storage buildings referred to in the *Arthaśāstra* of Kauṭilya and in the fragmentary Mahasthan Brāhmī inscription, for example, were of this type.

The prototype of the second group described above, which seems to have been as much common during the period under review as it is in our villages of today, is perhaps to be found in the primitive tribal house patterns of the Santals and the Juangs, for example, on the one hand, and in the Toda hut on the other. While the rectangular base and the shape and form of the walls agree very closely with those of the former, the pattern of the roof follows that of the Todas. In the latter case, the roof and the wall form an integrated whole, while in the former type, the roof is a distinctly separate architectural element, the weight of which rests on the wall forming a neck as it were between the head and the trunk (figs. 10 left, 22, 23, 28, 72, for example). The walls of such dwelling houses seem to have been made of reed, bamboo, branches of trees etc., with a plastering of mud or altogether of mud, and the roofing was presumably done with thatch and straw. That the thatch or straw covering was done on a frame work of bamboo is clearly manifest in figure 10 left, for example. We have at least one representation where this frame is indicated to have been made of wooden or bamboo ribs laid along the entire length of the roof. In another example it can be clearly seen that the roofing was done by small semi-circular tiles of exactly the same shape and form as is so frequently used even in modern times, mostly in Bihar and Uttar Pradesh. In Bengal, such tiles are known as *kholā* and the houses are called *kholā ghars*.

A second rectangular type with roofs similar to the one just described, but with an apsidal end, has a close affinity with the rock-cut *chaitya*-halls, and must have had a common origin, which is still unknown to us. We do not yet know of any tribal house of this type, that is, one provided with an apsidal end, nor have we any knowledge of such a type being current today anywhere in India. At any rate, at the present state of our knowledge, the origin of an apsidal roof is still difficult to be traced.

The third group of rectangular buildings seems to have been provided with a semi-circular or wagon-headed roof placed on the neck of four high walls. Here too, the exact pre-type is difficult to trace, but the type persisted through centuries and can still be seen in its modern adaptation in our railway wagons, railway and steamer godowns and in large state-managed grain storage houses (fig. 24, for example).

The third type described above is represented in a few examples on early Buddhist reliefs where it is shown to have been comprised of a square or rectangular ground plan and a curvilinear roof placed on the shoulders of the four walls. The roof which is usually made of leaves set in a pattern and presumably on a frame of bamboo and reed, looks in section like a flattened semi-circle, or like the segment of a circle. The walls of such houses were perhaps made, as usual, of bamboo, branches of trees, reed etc., and plastered over with mud or altogether with mud.

This type which can evidently be said to have a close relationship with the architectural form of the Sudama cave referred to above, seems to have persisted, in somewhat modified form, through the centuries. Since this persistence has already been pointed out in connection with the Sudama, it need not be repeated here. The modified type in various shapes and forms are quite frequent even today. The inherent relationship between the ancient and the modern types would at once be evident if both the types are viewed in sectional plans of the elevation.

Such rectangular houses with curvilinear roofs are still very common in the villages of Bengal and Orissa, sometimes with one single curvilinear roof, sometimes duplicated or even triplicated in gradually receding stages. The earliest duplicated version of such a curvilinear pattern can be seen in the twin houses represented on the Sohagaura Copper Plate (fig. 77) referred to above. In the inscription itself they are, however, referred to as granaries, though in contemporary Bengal such types are used as dwelling houses. The outline sketch as given in figure 77, makes the method of construction very clear.

REFERENCES

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2. Cowell, E. B.—*The Jātaka*, I. 138; II. 154, 175; III. 250, 277, 284, 312, for example.
3. Davids, Rhys—*Buddhist India*, p. 51.
4. Cowell, E. B.—*The Jātaka*, I. 6.
5. Ibid—IX. 423.
6. Ibid—II. 199; III. 257; XV. 306, for example.
7. Ibid—II. 199; III. 257, for example.
8. Ibid—316.
9. Ibid—206.
10. *Chullavagga*—VI. 4, 10. Trans. p. 189.
11. *Mahāvagga*—III. 5, 9. Trans. p. 304; also III. 5, 6. Trans. p. 303.
12. *Chullavagga*—VI. 3, 5. Trans. p. 175.
13. *Ṛig-Veda*—III. 53, 6; IV. 49, 6; VIII. 10, 1, etc., *Atharva-Veda*—VII. 83, 1; X. 6, 4; *Aitareya Brāhmaṇa*—VIII. 21; *Ṛig-Veda*—II. 42, 3; V. 76, 4; X. 18, 12, 85, 26, 142, 4, 165, 2; *Atharva-Veda*—I. 27, 4; III. 10, II; VI. 137, 1; *Aitareya Brāhmaṇa*—II. 31; VIII. 26. *Vājsaneyī Saṁhitā*—II. 32; IV. 33; XVIII. 44; *Śatapatha Brāhmaṇa*—I. 1, 2, 22, 6, 1, 19 etc. (*gṛiha* or *āgāra*). But as cattle, in *Ṛig-Veda*—VII. 56, 16; *Atharva-Veda*—I. 3, 4; IX. 3, 13, and as sheep in *Ṛig-Veda*—X. 106, 5; *Atharva-Veda*—III. 3.
14. *Ṛig-Veda*—VII. 85, 6.
15. *Atharva-Veda*—III. 3, 4.
16. Macdonell and Keith—Indian Text Series. *Vedic Index*, Vol. I, p. 245.
17. *Atharva-Veda*—IX. 6.
18. Pāṇini—IV. 4, 72; VII. 3, 25; IV. 4, 72.
19. *Kauṭilya Arthaśāstra*, in Bengali, edited by Radhagovinda Basak, I, p. 51.
20. Ibid—p. 212.
21. Ibid—p. 212.
22. See figures 1, 2, 4, 5, 7, 9, 10, 11, etc.
23. Macdonell and Keith—Indian Text Series. *Vedic Index*, Vol. I, p. 230, fn, 11.
24. Brown, Percy—*Indian Architecture: Buddhist and Hindu*, pl. VI, for a Toda hut.
25. That tiles were very much in use in roofing, has been amply proved by the excavations at Basarh which have yielded a large number of tiles found in the debris. On each side of a tile, near the edge there is a rim, one above and one below, a device by which one tile was joined with another. Near the top there is also a hole to take the peg by which the tile was fastened to the bamboo or wooden frame of the roof (*Ann. Rep. A.S.I.*, 1903-04, p. 94, plate XXXVIII, figs, 19 and 25). Similar tiles have been found from excavations at other places also in the Uttar Pradesh; they are now exhibited in the Lucknow Museum.

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Chapter Four

NAGARA-SANNIVEŚA

I

In the history of human civilisation the city is the response to the increase in complexity of a social organisaton. It represents a new magnitude in human settlement and presupposes a new economic organisation characterised by wheeled transports, specialised and localised crafts and industries, mobile traders and wide use of metal etc. It is also an expression of a social organisation that very largely depends on mutual co-operation between person and person, group and group, class and class etc.

The earliest trace of city-planning and city-building in India is provided by the ruins of the cities of Mohenjo-daro, Harappa, Lothal, Kalibangan and other sites of the Indus valley complex. The details of such planning and building are much too well-known to need any restatement.[1] From a comparative study of Indus valley city-planning and buildings with those of Ur, Assur, Irech and other ancient cities of the valleys of the Tigris and the Euphrates, Wheeler came to the conclusion that the socio-economic structure of the Indus cities "conformed in principle with that of the other great riverine civilisations of the day," and that they were administered "in a fashion not remote from that of the priests, kings and governors of Sumer and Akkad."[2] But it must be noted at the same time that the Indus valley cities were much more developed, much more scientifically and systematically planned and built. Certain basic principles of city-planning were observed very strictly in the Indus cities which the contemporary cities of the Tigris-Euphrates valley could not boast of. An analysis of the evidence furnished by the excavators' spade, reveals the most interesting fact that certain trades and industries were concentrated in specific streets and localities and the existence of sewers, granaries, private family latrines, public bath-rooms and pipes for disposal of rain and waste water from the terrace and floors of houses, is certainly evidence of a high standard of living, a relatively complex socio-economic organisation, advanced use of metallic tools and perhaps also of trade and industrial economy.

Recently, comparative studies of sizes of settlements, area of houses, large and small, and of width of streets of neolithic settlements, have been made with those of the cities of the Indus civilisation. It has provisionally been ascertained that urban houses were more commodious than any neolithic house and they covered larger areas and were divided into a greater number of rooms[3]. Such multiplication and separation of rooms were possible because of the spatial expansion of the settlements themselves.

The Aryan-speaking peoples of India presumably were not city-builders. The oldest Sanskrit word denoting city, i.e., *pura*, is usually derived from the Dravidian *ur* and from what we read in the *Rig-Veda* about Purandara's exploits in connection with the destruction of the ninety-nine *puras* of the Asuras who had been causing havoc to the gods, seem to refer to the *puras* of the Indus valley pre-Aryans.[4] Early literary texts of the Aryans also suggest that city-building was not a social activity in which the Aryans were proficient.[5] Whatever references to house-building activities of the Vedic Aryans we come across, seem to indicate that their houses were built of perishable materials and never in a very elaborate way or in a planned manner. It is also very significant that in later Sanskrit traditional literature of the *Itihāsa-Purāṇa* class, i.e., in the Epics and the *Purāṇas*, large-scale building activities are almost invariably associated with the *daityas*, *dānavas* and *asuras* who were presumably of the pre-Aryan and non-Aryan stocks that were gradually absorbed into the Aryan social system. One has only to refer in this connection, to such names as Maya-dānava and Viśvakarmā.[6] It is further significant that in the Brahmanical caste system architects, builders, sculptors etc., along with other craftsmen are always listed low down in the social scale. It has, therefore, been suggested that town-planning and city-building as organised and recognised social activities were adopted by the later Aryans from civilised pre-Aryans and non-Aryans like the peoples of the Indus Valley. This adoption may have followed the gradual transformation of the pastoral-agricultural economic order characterised by a mixed economy based on agriculture on the one hand and trade and commerce, also crafts and industries, on the other.[7] In any case there can hardly be any doubt that the growth of *pattanas* (port-towns), *nigamas* (market-towns), *durgas* (forts), *śākhā-nagarakas* (suburban-towns), *kshuddaka nagarakas* (small towns) etc., which we read of in early Buddhist texts, should be attributed to the transformation of the social economy just alluded to.

II

We have already indicated that the early Vedic Aryans were not city-builders. There are indeed references to *puras*,[8] but from the context it seems that such *puras* were always associated with the *dasyus* and the enemies of the Aryans. The word *nagara* too is found, but only as a derivative adjective. It is perhaps in the *Taittirīya Āraṇyaka* that the word appears in the sense of town for the first time,[9] and certainly much more frequently in later Sanskrit literature. From the use of the adjectival term *nagarim* in the *Aitareya Brāhmaṇa*[10] as well as in the *Jaiminīya Upanishad*,[11] it appears that towns of some description had already come into being. But as yet, city-building was not an important socio-economic activity.

It is only when we reach the period represented by the early Buddhist texts that we read of well-organised cities that must have grown up in response to demands made by increasing activities in arts and crafts and trade and commerce. A few cities may also have grown up in places associated with the life and activities of the Buddha and Mahāvīra, i.e., in places of religious interest, as well as for purposes of administration or of defence. The city of Rājagṛiha and Girivraja, which we read of so much in the early Buddhist texts, may have grown up in response to all the needs just referred to. But the majority of the cities seems to have come into existence for purposes of trade and commerce. An idea as to the area of more important cities can be had from what we are told about such cities as Vaiśālī (modern Basarh), Vārāṇasī, Mithilā, Takshaśilā etc. Vaiśālī or Vesāli, for example, was a very prosperous and well-defended city. We are told that "a triple wall encompassed the city wall, a league distant from the next, and there were three gates with watch towers."[12] Mithilā, the capital of the kingdom of Videha, was seven leagues,[13] while the city of Vārāṇasī or Kāśī twelve leagues in circuit.[14] Such cities seem to have been very well protected since any city of importance was surrounded by *prākāras* (walls) pierced by four gates at the four sides, and superimposed by towers. One of these four gates may have been recognised as the main gate; in any case, the *nagara-dvāra-toraṇa* or the tower of the city gate, is frequently referred to.[15] The tower of the city gate of Takshaśilā is said to have been as magnificent as the palace of the king. The average height of a city-wall seems to have been eighteen cubits.[16]

An idea as to the number of towns in a given kingdom can be had from more than one *Jātaka*. One *Jātaka* story refers to eighty-four thousand cities in one kingdom. There can be no doubt that the numbers have often been exaggerated to a legendary point, but this probably indicates that the number of towns must have been considerable.

It is somewhat unfortunate that we have very little connected information as to the planning of such cities, their lay-outs and their arrangements of localities. From several descriptions it seems that the palace of the king or of the local ruling authority was situated in the very heart of the city. We also read of roads and more frequently of drains, ostensively for carrying of waste water,[17] and of larger ones to carry off rain water. It also appears that cities were generally very crowded, perhaps also very noisy. Some of the oldest Buddhist texts indeed take pride in this fact,[18] and at least one *Jātaka* refers to a corner house at the junction of two streets which was very popularly patronised.[19] Another *Jātaka* refers to a town of eighty thousand shops,[20] certainly a very exaggerated number, but perhaps indicating that the number of shops in an average city was considerable. There are also certain references to municipal activities, as for example, in Cowell's *Jātaka* number 547.

A somewhat clear and relatively elaborate description of a city is found in the *Milinda-pañha* (Ch. I, Sec. 34, SBE XXXVI, pp. 330ff.). In this description we find that the architect of a city (*Vaddahi*=Skr. *Vardhakī*), intending to build one, searches out first a faultless pleasant spot, free from rocks, hills, gullies etc., and not open to danger of attack. The ground is then thoroughly cleared and made plain. The city is then laid out in regular measured quarters, with excavated moats and ramparts on all sides, with high towers and strong gate-houses, with cross-roads, street corners, market places and public squares, with clean and even main roads regularly lined by open shops, with parks, lakes, gardens, walls and lotus ponds, with many kinds of temples and free from every fault. "It is thus that a city stands in all its glory, and nobles, soldiers, craftsmen, foreigners and many other people resort to it. All residents are said to find the new city to be regular, faultless, pleasant and perfect, and so they all praise the architect by whom the city has been built."

Some evidence as to the planning of city can also be gleaned from Jain canonical texts. For example, according to the *Aupapātika-sūtra*, the important parts of a city were the moat (*phalihā*—Skr. *parikhā*), broad at the top and cut deep down (*uvviddhagambhīra-khāya-phalihā*), solidly built rampart bent in bow-like curves and provided with buttresses, bastions (*aṭṭālaya*), paths (*cariya*), doors (*dāra*) provided with strong door-leaves (*kavāḍa-phaliha*) and with *indakīla* (bolts), gates (*toraṇa*), towers (*gopura*) and high roads (*rāya-magga*). There are also pleasure parks (*ārāma*), gardens (*ujjāṇa*), pools (*agaḍa*) and tanks (*talāga*, *dīhiyā*, *vāvī*), etc. Mention of different types of shops including wood-shops, barbers' shops, slaughter houses, work-shops of blacksmiths, is to be found in such texts as the *Āchārāṅga* and *Uttarādhyayana sūtras*. The city also contained markets with market-lanes thronging with craftsmen (*Aupapātika Sūtra*). It was also provided with open spaces and wide junctions of three, four or six roads, the roads being lined by shops (*āpaṇa-gṛiha*) and houses (*koṭṭha*) on both sides. A house facing the road was known as *rathyābhimukha* or *abhimukha*; one turned away from it was called *bahirmukha*.

Already in the days of Pāṇini India had reared up a number of cities. The celebrated grammarian groups contemporary towns under two divisions: *udīcya grāma* (IV. 2.109) and *prācya grāma* (VII. 3.14). It will be noticed that the term he uses is *grāma*, but the place-names which he refers to under this head could not be just villages, or even if they were originally villages, they must have, by his time, grown into towns. The grammarian mentions a number of such places, for example, Kāpiśī, Śālātura, Takshaśilā, Gandhapura, Kauśāmbī, Saubhūta and Sarkara (mod. Sukkur), among others. According to Pāṇini, the most important parts of a city were its moat (*parikhā*), gate (*dvāra*) and rampart (*prākāra*). The city gates according to him, were named after the other cities towards which they opened (IV. 3.86). In more than one *sūtra* he seems to suggest that there were regular planning of cities with residential buildings (*śālā*) and business shops (*āpaṇa*) on both sides of streets which intersected each other (III. 3.119), royal storehouses (*koshṭhāgāra* and *bhāṇḍāgāra*), council halls (*rājasabhā*) and places for dramatic performances called *prekshā* (IV. 2.80).

The attitude of sacerdotal Brahmanical texts, however, does not seem to have been very much in favour of the growth of towns. Indeed, references as cities in the *Dharmaśāstras* and the *Dharmasūtras* are few and far between, and though we hear of laws regarding various art and craft guilds as well as of trade guilds, and incidentally also of localisation and specialisation of activities in these fields, these texts do not seem to view towns or cities with favour. In fact, Baudhāyana goes so far as to warn people desirous of spiritual growth, against residence in cities. In one place he states clearly that it is impossible for one to obtain salvation, who lives in a town covered with dust.

Not that the towns and cities were unknown to the *Dharmaśāstra* and *Dharmasūtra* writers. Yājñavalkya refers in a general way to *nagara* and Manu explicitly refers to the three attributes (*tri-guṇāḥ*) that characterised an average city.

III

It is in the *Arthaśāstra* of Kauṭilya, in the two chapters on *Nagara-sanniveśa* and *Durga-sanniveśa*, that we have for the first time a glimpse of the earliest Indian speculation in respect of town-planning. It is very doubtful if Kauṭilya had any existing city in view, though the description of Pāṭaliputra as given by Megasthenes and by other classical writers, agrees in general with what Kauṭilya says about his ideal city. But on the whole it is safer to accept Kauṭilya's idea of a city as a speculative essay on city-planning, and this too, more or less in a mechanical manner. His idea of a city-plan is more in the nature of a design in abstraction than a matter of social reality, a comment which may be applied with equal force to the idealistic speculations on the subject as are found, for example, in the *Purāṇas*, the *Mānasāra* and other *Vāstuśāstra* texts.

According to Kauṭilya,[illegible] a city-settlement was walled up on all four sides and very well fortified. Already in his days cities had come to be looked upon as centres not only of trade and commerce but also of culture, an ideology which finds eloquent expression in the *Kāmasūtra* of Vātsyāyana.[illegible] Indeed, Vātsyāyana seems to despise village-life and extol city-life which in his opinion was the only kind of life that was worth having. According to Kauṭilya, the towns alone were the homes of the rich and the seats of guilds and judicial tribunals.

In the centre of a city, according to Kauṭilya, in the midst of the houses of the people of all the four castes, stood the palace of the king, facing either north or east. Not very far, to the east of the centre and the palace, were the apartments of the gods, that is, temples and sacrificial places, residences of royal teachers, priests and ministers, and also the site for water reservoirs. Along the eastern boundary were the residences of bigger merchants, expert artisans and the people of the *Kshatriya* caste. Along the south lay the houses of the superintendents of various government departments including those of commerce and manufacture, also of prostitutes, musicians and of the people of the *Vaiśya* caste. To the west were the ordinary artisans and the lower grade merchants as well as the people of the *Śūdra* caste. To the north stood the temple of the artisans as well as of the tutelary deity of the city and houses of iron-smiths, stone-cutters and other artisans, and of the *Brāhmaṇas*. Guilds and various corporations of working men were located in the different corners of the city. The intermediate spaces were occupied by shops and markets. Cities of Kauṭilya's imagination and experience seem to have been very well-provided with wide and narrow roads meant for different purposes. As many as five kinds of high roads are mentioned in the *Arthāśastra*: the *rāja-patha* which was certainly the main high way for the high and the low; the *devapatha* which was presumably the road which led to the main temple or temples and was also used for taking out religious processions; the *mahāpatha* the meaning of which is not very clear; the *rathya*, i.e., the road for wheeled carts and chariots and the *chariya* which presumably was the road for pedestrians.

Such idealistic and abstract designs of cities are also to be found in the *Purāṇas* and are repeated with slight variations in the *Mānasāra*, the *Śukranītisāra* and other *śilpaśāstra* texts. An analysis of all such descriptions reveal most clearly that they represent not what actual city-planning as a socio-economic phenomenon was like in centemporary times, but more a kind of abstraction following the mechanical set up of different occupational groups, castes and classes in the city with gods, kings and priests, as the centre of the whole scheme.

Thus the *Agni-Purāṇa*[25] locates the *Brāhmaṇas*, pious men, judges and agricultural traders along the northern side; dancers, musicians and prostitutes and *Vaiśyas* along the south; *Kshatriyas*, military officers and spies along the east; and ministers, treasurers, physicians, armament traders and *Śūdras* along the west. Similarly, shops, markets, and peoples of various occupational groups, castes and classes are located in the north-east, north-west, south-east and south-west. It is further recommended that the temples of Vishṇu, Indra and other benevolent gods should be erected at all corners of the city walls. *Prākāra* or wall, *parikhā* or moat, *dvāra* or door, *toraṇa* or gate, *udyāna* or park, drains and temples etc. are common features of all ideal and abstract cities as described not only in the *Agni Purāṇa*, but also in the *Mānasāra*, the *Śukranītisāra* and other texts. Invariably the city is rectangular or square with four gates which determine the four main streets running from the gates to the very heart of the city. References are also made to the erection of buildings on both sides of the streets in well-arranged manner.

More elaborate descriptions of such abstract city designs can be found in the *Mānasāra* which divides cities into eight categories or classes: *rājadhānī, nagara, pura, nagarī, kheta, kharvaṭa, kubjaka* and *pattana.*[26] Some of these categories like *rājadhānī, pura* and *pattana*, meaning respectively, capital cities, fortified towns built for different purposes, and market towns, can easily be understood, but it is difficult to distinguish between, say, for example, *nagara* and *nagarī*. The same text also refers to the fact that all capital and large administrative towns, perhaps also fort-towns commanding strategic points, were very well-fortified and divided into the following classes: *Śivira, Vāhinī-mukha, Sthānīya, Droṇaka, Saṁviddha, Kolaka, Nigama* and *Skandhāvāra.*[27] According to the *Mānasāra* streets were planned so as to divide the city into different quarters. Such planning of a city in quarters is called *pada-vinyāsa* or arrangements of quarters according to castes and occupational groups, each *pada* or block being set apart for a particular caste, ocupational or professional group.[28]

According to the same text, the smallest town unit was 100×200×4 cubits and the largest was 7,200×14,400×4 cubits.[29] Towns should be built, the *Mānasāra* states, near the sea, a river or a mountain[30] and should have facilities for trade and commerce and should be laid either from east to west, or from north to south, according to the site. All cities should be provided with rampart walls, ditches, gates and gate-houses, drains, parks, shops, exchanges, temples, guest-houses etc.[31] In the larger cities serving as *rājadhānīs*, provisions are recommended to be made for special places for the king, princes, chief priests, ministers and military officers, also for various assembly-halls, dancing-halls, saloons and liquor-houses. Such larger cities were provided with high walls on all sides pierced by massive gates and crowned with watch towers.[32] In the general plan of a city it was usual to have outside the city wall, a moat on all sides and this moat was heavily infested with crocodiles. There were wide bridges over the moat which could be lifted whenever necessary. The *Mānasāra* also recommends that such cities should be laid out in several squares and that store-houses should be built near the rampart walls.[33]

Śukrāchārya's idea of planning as given in the *Śukranītisāra*, is somewhat different from those of Kauṭilya, the *Agni-Purāṇa* and the *Mānasāra.* He places the *sabhā* or the council-house in the centre of the city instead of the royal palace. But as in other texts, here is also a certain order in the location of the different occupational groups, castes and classes: first the important personages of the city, then the ordinary people, next the officers and finally the commanders of the army and the men of the warrior caste. According to the *Śukranītisāra*, it seems that wealth and birth were the two great criteria in the determination of the position of the house of a particular person. Everybody seemed to be vying with one another in getting as much near to the royal palace as possible. As to orientation, Śukra's prescription is that city-buildings should face either the north or the east,[34] just as we find in Kauṭilya's *Arthaśāstra.*

Interesting side-light as to the planning of cities and city-buildings is furnished by the two Epics, the *Rāmāyaṇa* and the *Mahābhārata*,[35] though one can never be sure as to which period such descriptions should be assigned to. In the form they are known to us, the *Rāmāyaṇa* cannot be dated earlier than the 2nd century A.D., and the *Mahābhārata* not earlier than the 4th, in which case the evidence furnished by them, shorn of their mythical elements and imaginative exaggerations, can be referred perhaps to the centuries immediately on both sides of the beginning of the Christian era.

The plan and the general layout of the capital city of Ayodhyā as given in the *Rāmāyaṇa*, have striking similarities with those that we find in the *Mānasāra* and other architectural treatises. The *Ādikāṇḍa* describes Ayodhyā as a city twelve *yojanas* long and three *yojanas* wide. Wide and symmetrically arranged streets divided the whole city area into well-laid quarters. There were also narrower minor roads and lanes leading to the wider ones. The houses stood on both sides of these streets, roads and lanes, one beside another, so that there was hardly any plot of land without human dwelling on it. It seems Ayodhyā of those days was a congested city and we are told that king Daśaratha made large extensions in order to relieve congestion. From the statement that the city had stout arched gateways with large door-panels, it seems that it was a walled city which had, in addition, a *śāla-mekhalā*, i.e., a belt of *śāla* trees. Besides, royal palaces and other buildings of the aristocracy and the nobility, shops, market-places etc., provisions seem also to have been made for town-halls and parks.[36]

The description of Svarṇa-Laṅkā as given in the *Sundarakāṇḍa*, is far too legendary and imaginative to give us any clue that can be used objectively for our purpose.[37]

In the *Sabhāparva* of the *Mahābhārata*, there is an interesting account of the building up of a city for purposes of the celebration of the *Rājasūya* sacrifice.[38] There are interesting descriptions of some assembly-halls and of a number of houses that were needed for the accommodation of the king's guests. Such words as *toraṇa* or arched gateway, *harmya* or masonary house, *devāyatana* or temple, *sabhā* or assembly hall, *prāsāda* or palace, *śikhara* or steeple, *vimāna* or tower or pavillion occur again and again and seem to be significant. None of them seems to have been meant to be applied to huts and thatched houses for which there were other words easily available.

In the *Ādiparva*, there is an interesting account of the city of Indraprastha which was very well fortified with very wide ditches running on all sides and with sky-high parapets furnished with gates. Inside the city, there were towers and palatial buildings. A fine layout of long and wide thoroughfares divided the city into various sections or quarters. Magnificent houses, pleasant retreats, a number of large and small tanks brimming with water, beautiful lakes fragrant with lilies and lotuses, large, charming parks and gardens with pools at the centre, artificial hills etc., that we read of in these descriptions, must have made Indraprastha of the days of the Kurus and the Pāṇḍavas, a magnificent city, even if we leave out the legendary and the imaginative elements that constitute an integral part of the description. It must, however, be pointed out in this connection that recent archaeological excavations at Indraprastha have not laid bare anything that can substantiate the above description.

IV

It may now be worthwhile to discuss briefly a few ancient cities of India, the plans and layout of which we have some idea of from archaeological excavations, and to examine them in the light of what we read of ancient cities in literary texts. The most important of such cities that have been laid bare by the archaeologists' spade are Rājagṛiha, Śrāvastī, Takshasilā, Bhita, Basarh, Kauśāmbī and Sisupalgarh.

RĀJAGṚIHA

Buddhaghosha, the celebrated Buddhist scholar, states that Rājagṛiha had two main divisions, one an *antanagara* or an inner city and another a *bahirnagara* or an outer city. What he had observed was probably an outer city as demarcated by high stone walls running along the top of the hills and the inner city demarcated by a pentagonal earthen wall. Hiuen Tsang also noticed that the palace area which was in the very heart of the inner city, was enclosed by two walls. The existence of two main divisions of the city is emphatically testified to by the *Rājavāda Jātaka*. While the inner city consisting of the palace area lay within the girdle of five hills that served as walls, the outer city too seems to have been guarded by a circuit wall beyond which lay the Magadha Janapada extending as far north-east as the Pāṭaligāma and the Ganges and as far south-west as Gorathagiri or Barabar hills. Archaeological explorations at Rājagṛiha have more or less confirmed these literary descriptions of the inner city. The palace which presumably was built of impermanent materials, has gone to dust, but the five hills making almost a circle, go to confirm the description of the *Sabhāparva* of the *Mahābhārata* that Girivraja was well-guarded by mountains on all sides. The gate through which one from the outer city enters the inner one can still be traced in the wide gaps between two hills. The remains of the walls of the outer city can also be traced in the raised mounds of rubble strewn all around the city. These must refer to the *prākāra* mentioned by Buddhaghosa.[39] Recent excavations at Rajgir have laid bare a series of secular buildings at more than two levels, and in one of the dwelling houses a small circular construction of what seems to have been a granary, has also been uncovered.

ŚRĀVASTI

According to early Buddhist texts, the city of Śrāvastī was situated on the banks of the river Achiravatī that used to nourish extensive wheat fields on its banks. Buddhaghosha says that the city extended over 300 leagues and was enclosed by walls. We are told that within the city there were three broad rings or divisions, namely central, outer and outer-most, the royal palace and the court occupying the centre. A bas-relief representation of the city of Śrāvastī on the railings of Barhut, also shows unmistakably that the city was enclosed by walls pierced by gates. The mango-grove that was purchased by Anāthapiṇḍaka and made over as a gift to the Buddha, was outside the walls of the main city and on the other side of the river. According to the *Vinaya Piṭaka*, prince Jeta built a number of buildings within the enclosure of the mango-grove, namely *vihāras*, *padhivinas* (retiring rooms), *koṭṭhakas* (apartments or store rooms), *kappiya kuṭhis* (store houses outside the *vihāra*), *aggiśālās* (houses with fire-places), *upatthāna śālās* (service halls), *vachcha kuṭis* (closets), *chaṁkamas* (perambulating paths), *chamkaṁana śālās* (halls for walking exercise), *udapanas* (wells) and *janta-gharas* etc.[40]

Archaeological excavations have laid bare the entire layout of the city of Śrāvastī and of what remains of the Jetavanārāma. The Achiravatī is today represented by the low lying fields through which even during the rainy season one can walk across wading through knee-deep water. The remains of the city-walls can still be seen and though the three broad rings and divisions referred to by Buddhaghosha cannot be clearly traced from what remains of the original plan there can be no doubt that the palace and the court occupied the centre of the town. A very broad main street ran through the entire length of the city and was crossed at right angles by subsidiary streets. The foundation of the houses on both sides of the streets can still be seen. On the other side of the river Achiravatī lay the quiet mango-grove of prince Jeta the outlines of which can still be reconstructed. The original buildings built by Jeta can no longer be traced, but the ruins of monasteries built at later times are still there. It is presumed that they were built more or less on the same plan, which judging from extant remains, seem to have been very well-organised.[41]

TAKSHAŚILĀ

The long series of excavations at the various sites at Taxila give us important glimpses into the general planning of the city as well as into that of its buildings from about the beginning of the Christian era to about the 3rd century A.D., that is, roughly during the Kushāṇa and Śaka periods. Below them are the remains of earlier settlements which may be assigned to the period covered by the Scytho-Parthians and the Greeks.

Excavations have established that the entire Taxila area was covered over with at least three important cities respectively at Bhir Mound, Sirkap and Sirsukh.

The third city, Sirsukh, was situated on the opposite side of the Lundi Nath. This city appears to have been built by the Kushāṇas, probably during the reign of Kaṇishka. Its plan was roughly that of a parallellogram and the circuit of the walls was about 3 miles.[42]

The city at Bhir Mound was the oldest of all old cities at Taxila. It seems to have been built in the early part of the second century B.C., but at a later period the city was presumably shifted to the Sirkap area.

The city at Sirkap as laid bare before us, may be taken as the representative of the other cities of the region, insofar as city-planning and house-building activities are concerned. It includes an area still called *Kachcha kot* wich presumably suggests that the city was protected by an earthen rampart. The inner city which is of stone, is a later creation. On the western side the city wall runs in an irregular line broken by various recesses. But the north and the east sides are quite straight and the south-east corner of the plateau shows the same straight line up the steep side of the ground. The outer side of the wall is strengthened by bastions, all rectangular in plan. To the west of the north gate, there are some rooms which were evidently intended for the guards. On the opposite side of the high street the remains of the ramps prove that the defenders could mount on the wall. The main city must have been a steep one. The level of the ground rises gradually and is progressively steeper. Apart from the consideration that such levelling reflected the social grades into which contemporary society was organised, it helped solution of the problem of drainage.

A high street ran through the heart of the lower city lined on either side by a large number of buildings. There were also side streets similarly lined by dewelling houses. The very regular lay-out may be characterised as

Hellenistic rather than Indian though in the buildings themselves there is hardly anything which can be similarly characterised. The palace occupied a central position on the east side of the high street. There were atleast three entrances to the palace, and each entrance was connected with roads leading to all important centres of the town. Indeed, the palace seems to have been situated at the corner where the two main streets running north-south and east-west converged, and consisted of a court of private audience, a court of the guards, a turret at the south-west corner, a court of public audience, women's quarters, a private chapel and a self-contained royal residence, among other things. The oldest parts of the palace were built of rough rubble masonry and are perhaps datable about the beginning of the Christian era. Private houses at Sirkap were all built of rubble masonary and seem to have been directly influenced by Parthian practices in about the middle of the 1st century A.D. Contemporary Parthian practices however tend to be less symmetrical than one can expect from a city so regularly laid out as Sirkap. But the later house show a definite improvement from those of the earlier settlements at Bhir Mound. The unit of the design with small rooms or *chatuḥśālās*, set around a central courtyard, shows indeed a very civilised outlook and follows the regular plan of the house itself. "There are doors communicating between the inner rooms, but there are seldom any doors leaving access to the interior from the courts or street outside."[44]

Speaking generally, there were various types of houses, and they were a rambling conglomeration of ill-alligned and ill-built walls. On the outside of the northern walls were the suburbs inhabited by people who belonged to the lower social grades. Such an arrangement seems to resemble the exclusive and sophisticated pattern of the people of the Indus valley where the menial or the low-class people were assigned separate areas of their own.[45]

One of the most important features of the city-planning of ancient Sirkap is what is assumed to have been the acropolis of the city, situated at the south-west, on the isolated flat-topped hill of the Hathial Spur. There is no doubt that this was Hellenistic in inspiration, though it is difficult to reconstruct its plan and form from the extant remains.

KAUŚĀMBĪ

Kauśāmbī is frequently referred to in Pāli texts as the capital city of the Vatsa king Udayana. But the existence of the city can be traced in the Epics and the *Purāṇas*. Unfortunately the ruins of ancient Kauśāmbī which can now be definitely identified, afford us very little clue in respect of the plan of the city or the design of its buildings. Except marks of old foundations, earthen ramparts, and an immense fortress with high bastions and broken bricks nothing of the old city remains.

Situated on the bank of Yamunā it was a rich commercial city. According to the *Sutta Nipāta* it was the most important entrepot for both goods and passengers coming to Kośala and Magadha from the south and west.[46] There is every likelihood that this ancient city was divided by high and wide roads to enable long caravans pass easily along them. It was natural that a rich mecantile city like Kauśāmbī should have numerous buildings of varied designs. In 1817 when Cunningham visited the site he noticed extensive ruins of such buildings, but those are no more.[47] Excavations at the site have been just resumed but results are not yet known.

BHITA

Bhita, Vichhi or Vichhi-gāma, was only a small country town.[48] Before the 5th century B.C. Bhita was an unimportant village. The houses were naturally made of mud. "So none of the brick buildings that have been excavated on this site can be assigned to an earlier date than the 4th century B.C."[49] The foundation of the buildings in Bhita start from a depth of four feet below the ground level. Amongst the group of buildings the most important was the "house of the guild." The plan of the building is simple. In the centre there is an open rectangular courtyard with twelve rooms arranged on four sides (*chatuḥ-śālā*). In front of one of these chambers there is a small verandah. The plan resembles the general arrangement of an average Buddhist monastery. The bricks of the chambers on the south-east side measure 18½′×9′×2½′ while those of the other chambers, 21′×10½′×2½′. The bricks were laid as headers resulting in the extreme thickness of the walls. It perhaps indicates that the houses had more than one storey. There are also the remains of what has been identified as the house of Nāgadeva, the area of which is surrounded by a circuit wall. But here the rooms are of various sizes and the verandah is considerably larger. The house consisted of three rooms and in front of these rooms there was a raised platform, very much like what is commonly seen in the Indian bazars of today. Archaeologists therefore believe that the house was a residential one, with a shop on the verandah in front. The remains of more than one such house have been discovered at this site, and they are all more or less of the same pattern. The town itself seems to have been originally provided with a wooden wall on all sides.[50]

BASARH

Inside the modern village of Basarh (ancient Vaiśālī) lie the remains of several old brick buildings. In the southern section of the village still stand what remains of the fort of the traditional Rājā Viśāl. The four corners of what seem to have been the ancient city of Vaiśālī, are today marked by four Liṅgas. If this be true the ancient city must then have been of the shape of a quadrangle, and the old Vāṇiya-gāma which was an important section of Vaiśālī, must have been outside the city proper. The ruins of Basarh belong mostly to the period of the Imperial Guptas. Foundations of brick buildings with remains of cement floors, can be found here and there. The houses in general consisted of a room measuring 23 × 15 feet, with smaller chambers attached to its eastern and western sides. They were connected with the central room by doors. Traces of cement pavement still exist. On the north side of the town we come upon a line of wall running in the north-east direction. This wall seems to have formed part of a line of houses along which there was a road. The arrangement of this quarter of the town seems to have been of a linear type. Disconnected traces of a great variety of houses have been exhumed here and there. From the ruins it would appear that some of the houses at any rate, were roofed by tiles. The main city seems to have been divided by wide roads, but it is difficult from what remains, to reconstruct the general plan of the city.[51]

SISUPALGARH

Recent excavations at Sisupalgarh have unearthed the remains of what was presumably a fortified city, roughly a square, each side measuring about three quarter of a mile, and surrounded by a moat fed by a small rivulet flowing along one of the sides. The defences of the city consisted of a massive clay rampart about 25 ft. high. "The contours clearly suggest the existence of corner-towers and eight large gateways, two on each side, beside about the same number of smaller openings distributed all over the perimeter. The gateways are so placed that if the distance between two corner-towers of any side is trisected, a gateway will be found at or near each point of trisection. Such a disposition clearly suggests a regular planning not only of the fortifications but presumably also of the streets inside, which are likely to have run east-west and north-south, connecting the opposite gateway in a grid-pattern."

The earliest strata have yielded no remains of any structure. But the next four levels have laid bare remains of structures constructed of large chiselled laterite blocks. The topmost of these four has revealed two adjoining houses, both built of laterite blocks, one of which consisted of two rooms measuring 10×8 ft. and 10×9 ft. with a verandah 19×8 ft. in front. The plan of the other house is not clear. Remains of houses made of baked brick have also been found; in one of such houses can still be seen a doorsil.[52]

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19. Cowell, E. B.—*The Jātaka*—No. 350.
20. Sen, B. C.—Studies in the Jātakas, in *Journal of the Department of Letters*, C.U., Vol. XX.
21. *Dharma Sūtra*—II. 3, 6, 33.
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24. Chakladar, H. C.—*Social life in Ancient India*. pp. 146-148.
25. *Agni-Purāṇa*—Ch. 106, V. 1-13 and 6-17.
26. Acharyya, P. K.—*Architecture of Mānasāra*, Ch. X, p. 95.
27. Ibid.—Ch. X, pp. 96-97.
28. Ibid—Ch. IX, p. 89.
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31. Acharya, P. K.—*Dictionary of Hindu Architecture*.
32. Acharya, P. K.—*Architecture of Mānasāra*—Ch. X.
33. Ibid—Ch. XXXVI.
34. *Śukranītisāra*—Ch. VI, Sec. 4.
35. Hopkins, E. W.—Position of the Ruling caste in Ancient India, in *Journal of the American Oriental Society*, Vol. 13. Chapter on City.
36. *Rāmāyana*, Ādikāṇda, Ch. 5.
37. *Rāmāyana*, Ch. VI, 3rd *Sarga*.
38. *Mahābhārata*, Book II, Ch. 34.
39. Marshall, J.—Rājgṛiha and its remains, in *Annual Report of the Archaeological Survey of India*, 1905-06, pp. 86-106. On the top of the Vaibhāra hill at Rajgir there is a remarkable stone structure locally known as *mashan* (watch-tower) called Jarasandha-ka Baiṭhak, a monument noticed by Hiuen Tsang and usually identified as the residence of Pippala and Mahakassapa of the Buddhist tradition. That this monument is the earliest structure in stone in India, there can be no doubt. Nor can there be any doubt as to its original purpose of serving as a watch-tower, 'the small chambers near its base providing shelters for the guards'. It is 'in the form of a large rectangular platform 85 ft. by 81 ft. at the base, and 81 ft. 6 in. by 78 ft. at the top, and 22 ft. to 28 ft. high. It is built of large unhewn blocks of stone set in the rock without any mortar and contains near the base several small irregularly shaped cells on all sides. . . Its walls, like those of the rectangular bastions of the outer city walls of old Rajgir, have a slight batter.' Ghosh, A.—*Guide to Rajgir*, pp. 14-15.
40. *Vinaya Piṭaka*, II.
41. Marshall, J.—*Guide to Taxila*, Ch. IX, pp. 109-117.
42. Marshall, J. *Guide to Taxila*, Ch. VII, pp. 80-98.
43. Ibid—p. 72.
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47. Cunningham—*The Ancient Geography of India* (ed. Majumdar), p. 454.
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CHAPTER FIVE

DURGA-SANNIVEŚA

THE word *pura* occurs frequently in the *Ṛig-Veda*[1] as well as in the later *Brāhmaṇas*[2] and presumably means places of shelter or residence with strong walls or ramparts all around. Such walled shelters or fortifications were probably sometimes of considerable size and proportion, broad (*pṛithivī*) and wide (*urvī*) and strong (*śāśvata*)[3]. Once at least it is suggested that such fortifications were sometimes made of stone (*asmamayī*) and sometimes also of iron (*ayasī*).[4] Probably all that is meant is that they were very strong, the allusions to stone and iron being merely metaphorical, though by no means this is certain. The *Atharva-Veda* refers to a *pura* full of cattle (*gomate*)[5], perhaps indicating that fortifications were also used to hold cattle. In two passages of the *Ṛig-Veda*[6] there are references to defences being thrown up against enemy attacks. The seige of *puras* is also referred to in the *Saṁhitās* and *Brāhmaṇas*. In the *Saṁhitās*[7] and the *Gopatha Brāhmaṇa*,[8] we are introduced to *mahāpuras*, which perhaps suggest that the difference between a *pura* and a *mahāpura* lay in their relative sizes and proportions.

It is perhaps doubtful if one can take the word *pura* or *mahāpura* to mean fort of any size in the mediaeval European sense or in that of the mediaeval Indian, and translate the word *pura* as fort or fortress. All that is probably meant is that the word stands for any place of residence or shelter, small or large, which was surrounded by high, wide and strong walls, in a word, a walled town, city or locality. Undoubtedly such cities or towns were, at least in certain cases, used as shelters against enemy attack, or against depredations of robbers and wild animals, perhaps also against inundations caused by overflowing rivers. As such the walls or fortifications were probably made of hardened earth with palisades and also a ditch running all around. It is also quite likely that sometimes walls and palisades were built of wood and surrounded by a ditch. Indeed, such were the fortifications of Pāṭaliputra as witnessed by Megasthenes.[9] From one reference at least, it seems that sometimes the walls were built also of sun-dried brick.[10]

At one place in the *Ṛig-Veda*, reference is made to a *śārada pura*[11] that is an autumnal castle or city belonging to the *dāsas*. This seems to suggest that there were walled cities which were occupied in particular seasons only, for what reason it is not clear. But what is more interesting is that most *Ṛig-Vedic* references to *puras* clearly associate them with the *dāsas* and the *dasyus*. Indra claims to have shattered a hundred *puras* of *dasyu* Sambara[12] as well as a few *puras* of *dasyu* Pipru.[13] Indeed, everywhere in connection with the exploits of Indra, the *puras* of the *dāsas* and *dasyus* figure prominently and repeatedly, so much so that it seems permissible to credit the pre-Aryan *dāsas* and *dasyus* with the origin and use of fortifications in a large scale, so far as Indian civilisation at any rate, is concerned.

Even a decade or two ago these *puras* of *dāsas* and *dasyus* were considered to have been mere figments of imagination of the composers of the Ṛig-vedic hymns, or at the most, primitive earth works with palisades, of pre-Aryan aborigines. But latest excavations at the Indus valley sites of Harappa and Mohenjodaro by Mortimer Wheeler have unearthed strong and massive fortifications built of hardened earth and mud bricks, with high, strong and wide ramparts, that used to encompass the well-planned, elaborate and sophisticated cities of the Indus valley.[14] We may bear in mind that it was this Indus valley that presumably witnessed the prolonged fight between the Ṛig-vedic Aryans and the pre-Aryan *dāsas* and *dasyus*. Indeed, literary and archaeological evidence at our disposal seems to point to the fact that the *puras* that are claimed to have been destroyed by Indra called Purandara or 'Destroyer of Forts', may well have been these fortified cities of the Indus valley civilisation.[15] The Ṛig-vedic Aryans were pastoral agricultural peoples and they do not seem to have had any experience of the kind of complex and elaborate urban civilisation as represented by the cities of Harappa and Mohenjodaro. Remains of walled fortifications were also unearthed by the late Mr. N. G. Majumdar, at Ali Murad and Kohtras Bulhi, also belonging to the same chalcolithic period.[16] But whereas at Harappa and Mohenjodaro the fortifications were made of hardened earth, at Kohtras Bulhi, Majumdar unearthed a long rampart wall of irregularly dressed but fairly large stone blocks.

Such stone fortifications may explain the Ṛig-vedic reference to *asmamayī puras* or cities surrounded by stone walls.[17] An idea of what such stone *puras* looked like in a smaller scale may presumably be had from the remains of what is known as the *Jarāsandha-kā-baiṭhak* (the residence of the semi-mythical demon hero Jarāsandha) at Rajgir or ancient Rājagṛiha, to which reference has already been made in a previous chapter. The fact that the building is associated with the name of a demon or *rākshasa* and that it is the oldest of all our structural remains of relatively historical times, are both certainly very significant. Jarāsandha, it is well-known, was one of the epic heroes of the *Mahābhārata;* he was the king of Magadha which seems to have been the easternmost region of the great Epic, and it is not unlikely that the *baiṭhak* at Rajgir was the royal watchtower. It stands on an admirably selected site, an uneven valley with hills on all sides. "Undressed stones between three and five feet in length, carefully cut and laid with chips or fragments of stone packing the interstices between them", went to the making of the outer defence walls. No mortar or cement seems to have been used.[18] The fortifications at Rājagṛiha perhaps afford an example of the continuous tradition to which belong similar stone fortifications of the chalcolithic period and the strong walls and battlemented towers that we read accounts of in the *Mahābhārata* and the *Rāmāyaṇa*. Hopkins however states that, "accounts of full fortifications must be regarded as foreign to the first form of the poem . . . . though walled cities were known in early times, strong stone walls and battlemented towers belong to the late *Mahābhārata-Rāmāyaṇa* period."[19]

To Indian tradition as represented by the Sanskrit Epics and the Pāli *Jātakas*, forts and fortifications around the capital city or important seats of governments, sometimes also around smaller cities, seem to have been very familiar. In both the Epics, the *Mahābhārata* and the *Rāmāyaṇa*, there are frequent references to *prākāra* and *toraṇa* or walls or ramparts and towers or gates in connection with cities.[20] Stone and iron ramparts are also mentioned, though not very frequently.[21] To cite only two examples, in the *Ādikāṇḍa* of the *Rāmāyaṇa* (Ch. 5) the city of Ayodhyā is described as having stout arched gates with large door panels and multitudes of lofty castles, and surrounding the city, we are told, was a belt of *śāla* trees. In the *Ādiparva* of the *Mahābhārata* (Ch. 217), the city of Hastināpur is described as being surrounded with sea-like ditches in which crocodiles used to swim about and with sky-high ramparts furnished with massive gates, towers and doors. We are further told that store houses were built near the ramparts. But Hopkins is probably right when he says that though walled cities were known in early times, strong stone walls with battlemented towers belong to the later Epic period. In the later portions of the Epics, cities with strong stone walls and battlemented towers are frequently mentioned and these are there predicated of cities in such a way as to lead us to suppose that the fort walls referred to in such descriptions were presumably of permanent materials. Walls or ramparts made of impermanent materials such as hardened earth and wood and bamboo, known as *vapra* and *chaya*, belong presumably to the Epic period.[23]

Very much like of what we read in the Epics about forts and fortifications one finds in the Pāli *Jātaka* stories as well; the Pāli descriptions are only brief and casual. Thus the *Mahā-Ummagga Jātaka*, for example, states that the city of Mithilā was surrounded by a rampart with watch towers at the gates. As a measure of further defence, the city was also provided with three moats, outside of the ramparts, a water moat, a mud moat and a dry moat.[24] The city of Banaras was also fortified with walls, gates and towers and battlements.[25] We are further told that these city walls were twelve leagues round by themselves.[26] The *Mahā-Janaka Jātaka* refers to Champā as a city provided with walls, gates and watch towers.[27] The *Ekapaṇṇa Jātaka* states that a triple wall encompassed the city of Vesāli, each wall a league distant from the next and that there were three gates, with watch towers on each one of them.[28] In another description of the city of Mithilā, we are told that the city walls were traversed by wide streets on all sides. It is clear from even these few references that cities in the *Gaṅgā-Yamunā* valley of those days, were all more or less fortified for purposes of safety and defence. What these fortifications were like or what materials were used in their construction, is not always very easy to ascertain, but if early Buddhist relief sculptures are any indication it seems that though wood was more in extensive use, at least in certain cities the walls, gates and watch-towers were built of brick and stone. It is, however, permissible to hold that in smaller cities in less important areas, such walls and gates and towers may have been made of hardened earth, wood and bamboo etc. In one *Jātaka* at least,[29] mention is made of an iron town, meaning perhaps that at important points of the *prākāra*, or rampart *ayasam* or iron was used in the form of pegs and buttresses. The archway of the city gates is frequently referred to as *nagaradāra-koṭṭhaka*[30] which means that by the sides of the city gates, there were chambers and apartments. The mention of *ayas* in the *Jātakas* in connection with cities, or of *ayasī* in the *Vedas* in connection with *puras* may be taken to signify if not the real existence of fort-walls built of iron, at least the strong nature of the fortifications.

The impression left by the *Jātakas* in this connection, is one of a predominantly agricultural-mercantile community of some affluence, that needed good protection against the predatory elements of society. The king and his royal city was also certainly in need of good defence arrangements to enable him keep off the enemies of his kingdom; but this aspect of the need for fortified cities do not seem to have received in the *Jātakas* so much importance as it seems to have done in the early and later Brahmanical (Sanskrit) texts as the *Manusaṁhitā*, the *Arthaśāstra* of Kauṭilya, the *Yuktikalpataru*, the *Mānasāra*, the *Śukranītisāra* etc. Indeed, the attitude and approach of these texts are principally, if not exclusively, from the point of view of defence of the royal city and the kingdom against enemy attacks, or of aggressive attacks on the enemy in times of war. Somadeva[31] for example, goes so far as to say that "a king without a fort has no refuge, just like a bird let loose from a ship in the midst of the ocean." According to the author of the *Sāraṅgadharapaddhati*[32] a king without a fort is compared to a snake without poison or an elephant without tusks. The *Yuktikalpataru*[33] seems to assert that the ordinary military strength of a king is, in fact, no strength and that his real strength lies in his forts. These are all later texts, no doubt, but they seem to reflect the attitude that has been growing ever since the days, it seems, of the Mauryas which witnessed the underlining of the importance of monarchy and the machinery of a monarchical state.

The *Arthaśāstra* of Kauṭilya in its extant form may not be ascribed to the Maurya period, but there can hardly be any doubt that it reflects, to a very great extent, the facts and the ideologies that obtained in those days. According to Kauṭilya, the *durga* or the fortified city is one of the seven constituent elements of the state, and it was considered more important than the treasury and the army itself. "For, it is in the fort that the treasury and the army are safely kept, and it is from the fort that secret war, controls over one's partisans, the upkeep of the army, the reception of allies and the driving out of enemies are successfully practised. For those who own forts there is no destruction."[34] A thorough-going theorist that Kauṭilya was, it is not at all surprising that he would go into details in respect of the classification, lay-out and organisations of forts which shows that the art and science of fortified city-building on an elaborate scale had already attained familiarity.

Kauṭilya classifies forts under four principal heads, on the basis of their location: (*a*) *Pārvata* or hill fort that is either perched on a rocky precipice or built in a valley in the midst of an encircling range of hills; (*b*) *Audaka* or water fort, a fort situated on an island in the midst of a river or on a plane surrounded by low watery ground or stagnant morass; (*c*) *Dhānvana* or desert fort, a fort located either in the centre of a wild tract devoid of water or even covered with thickets, or in a region sterilised by desert salt; (*d*) *Vanadurga* or forest fort, a fort either encompassed by fens and hogs and interspersed with trees and bushes, or girt by thick growth of tall trees with bushy underground. Of these four[35] Kauṭilya has clear preference for *Pārvata* or hill forts for which he gives reasons that are fairly obvious,[36] and then he says: "of forts such as a fort on the plane, in the centre of a river and on a mountain, that which is mentioned later is of more advantage than the one previously mentioned"[37]. Kauṭilya seems to enjoin upon the king that he should rear up adequate defences on all four quarters of the boundaries of the kingdom, and also that he should have a fortified capital city which might be of any shape, circular, rectangular or square, but which should be surrounded by three successive ditches. He recommends that the sides of such ditches should be built of stone or brick, that they should be filled with perennial water and that crocodiles and lotus plants should be nurtured in their waters. At a distance of 24 feet from the innermost ditch, a rampart 36 ft. high and twice as much wide should be built; on the ramparts are to be erected brick walls (*prākāras*) with parapets, interspersed at regular intervals with towers and bastions. "In the intermediate space between two towers there should be a broad street in two compartments, covered with a roof, and two and a half times as long as it is broad. Obviously this street was intended for patrolling by sentinels, and the bifurcation of the street in two compartments, equally obviously, for facilitating forward and backward movements of the sentinels or guards. According to Kauṭilya, the main entrance gate should be "one sixth as broad as the width of the street"; above the gateway there should be a turret with a face resembling a large lizard. He also recommends provisions for special secret passages for flight or exit, in unassailable parts of the ramparts.[38]

Kauṭilya's decided preference for hill forts is also shared by Manu. In the

Manusaṁhitā we read: "Let him (the king) build a town, making for his safety, a fortress, protected by a desert or a fortess built of (stone and) earth, or one protected by water or trees, or one (formed) by an encampment of armed men or a hill-fort. Let him make every effort to secure a hill fort which is distinguished by many superior qualities." Manu then proceeds to point out the importance of fort from the point of view of the king and his kingdom, and says finally as it were: "Let him (the king) cause to be built for himself in the centre (of the fort), a spacious palace (well) protected, habitable in every season, resplendent with white wash and supplied with water and trees."[39]

The fact that hills, or raised mounds of considerable proportions at any rate, were relatively the most suitable sites for fortified cities, is amply borne out by what the spade of the archaeologist has revealed to us, at places like Taxila, for example, as well as by the accounts left to us by the classical authors which we shall have occasion to refer to.

Dr. P. C. Chakravarty makes a very fine point in tracing the evolution of forts and fortified cities from primitive earthwork, with or without bamboo or wood palisades, to the highly elaborate walled cities with high stone or brick-built ramparts provided with high gates, towers, battlements, ditches or canals, etc. "It is obvious that in the history of military architecture any improvement in defence is the consequence of improved methods of attack. The walled town, the castle or private citadel, succeeded the palisaded earthwork as a natural development of the art of siege. "[40] However, up to a relatively late stage in history, fortifications of various nature and character seem to have existed contemporaneously, depending on the nature and character of protection and defence of a particular city or town. Thus while the city walls of Pāṭaliputra as described by Megasthenes, were built of timber, contemporary cities of the Punjab and the northwest appear, from the evidence of classical writers, to have been built of more permanent materials like brick and stone. The plans followed and architectural constituents employed, namely gates, towers, moats, palisades etc., were more or less on lines familiar to the planners and builders and recorded in minute details in treatises like the *Arthaśāstra* of Kauṭilya. Arrian says that fortifications of cities "which are down beside the river or on the sea, are made of wood; for towns built of brick would never hold out for any length of time with the rains on the one hand and on the other, the rivers which rise above their banks and spread a sheet of water over the plains"[41]

Literary and archaeological evidence seems to indicate that every town and city in ancient India of any importance, was fortified in some way or other, for purposes of protection, defence or attack. But it seems also that the city was not co-extensive, in all cases and epochs, at least in later days, with the citadel itself, which often was included within the city, in the centre or in some special part of it. Within the citadel were the residences of the king, his ministers, army chiefs etc., and their courts and officers, assembly halls, the main temple or temples; outside in the city there were the residences of lesser personages and of the army, of merchantmen, and the shops and markets etc. The common people seem to have lived outside the city gates, or away in the villages. Sometimes important temples were also fortified, since, not in a few instances, temples in ancient India used to serve as depositories of wealth, especially in gold, silver and other precious metals and minerals. The *Hayaśīrsha-Pañcharātra* says that the height of the walls of a divine edifice should be a quarter of the latter's height. But as a general rule, during the period we are speaking of, that is, up to about the early Gupta period, any town or city of some importance was a fort, any fort a town or a city. It is significant that the Sanskrit word *pura* which means a city or town was used in the Vedic age in the sense of a fort. The descriptions of such cities as those of Indraprastha, Ayodhyā, Laṅkā, etc. as we read of in the Epics and the *Purāṇas*, or those of Vidiśā, Vaisālī, Srāvastī, Vārānasi etc., as we read of in early Buddhist literature, clearly indicate that they were all fortified cities. This seems to be the indication of the evidence of early Buddhist narrative reliefs as well. On these reliefs nothing is more clear than the surrounding city walls, the city gates and towers, the battlemented parapets and the moats often indicated by flowing and wavy waters with lotuses floating on them.[42] The *Milinda-pañha* speaks of deep (*gambhīra*) and triple (*timahāparikhā*) moats; the *ṭīkā* or the gloss of this text also speaks of *utkiṇṇāntara parikhām* or an excavated inner moat, and enumerates the three successive moats as *udaka, kaddama* and *sukha*, that is a water moat, a mud moat and a dry moat.[43] It will be noticed that this is very much like the description of moats we read of in the *Jātakas* and in the *Arthaśāstra* of Kauṭilya. From the point of view of early Indian civic architecture the utilitarian significance of the moats or ditches which are integral injunctions in respect of the planning of a walled city, is obvious. They were not mere defensive works, nor were they excavated just for beauty's sake. More significant is the fact that these moats were the sources of water supply of the city, and besides, they also supplied the earth necessary for raising the city site, for building the walls, for filling in the low marshes and levelling the ground, or making the ground sloping or convex in order to let the rain water flow easily into the moats. Indeed, Bharata lays down that city walls are to be constructed of the earth dug out of the ditches.[44]

The evidence left by classical authors in respect of fortified cities of the northwest and the Punjab and of Pāṭaliputra is relevant to the topic under discussion. At the time of Alexander's invasion of India the capital of almost every state, big or small, seems to have been fortified with defensive walls. The capital city of the Malloi, for example, was defended by walls, so says Arrian, and within these walls there was a citadel with gates, towers, and parapets.[45] According to the same authority, the city of the Aspasioi was surrounded by a double line of walls, the outer a weaker one rudely constructed, but the inner one was very strong.[46] The capital city of the Brāhmaṇas had a double line of walls; when the city was besieged and the outer line gave way, the citizens took shelter within the citadel;[47] the capital city of the Sambos was also very strongly fortified and Alexander had to occupy the city by making a passage into it underground.[48] The capital city of king Sophytes (Subhuti?) had also very strong fortifications adorned with towers.[49] Palimbothra or Pāṭaliputra, the capital city of Magadha and the largest city in contemporary India, was, says Megasthenes, defended by a massive wooden palisade, pierced by 64 gates and crowned by 575 towers. The palisade was provided with holes for use of the archers, and outside there was a ditch, 30 cubits deep and 400 cubits broad, which was filled from the waters of the great river flowing by.[50]

The general picture of fortifications left by the classical writers is thus very much the same as one gets from the evidence of the Epics and the *Purāṇas*, early Buddhist texts and the theoretical treatises like the *Arthaśāstra* of Kauṭilya or the *Manusaṁhitā*.

Later Sanskrit treatises, mainly theoretical and technical in character, only serve to elaborate on what we know from earlier sources. For example, we read of detailed classifications of forts and fortifications in more than one text, and in that connection elaborate descriptions are given as to the nature of their locations, their gates and towers, parapets and battlements, ramparts and moats. Thus Bhoja in his *Yuktikalpataru*[51] says that forts may be *kritrima* (artificial or man-built) or *akritrima* (natural). A natural or *akritrima* fort is one which makes large use of natural defensive advantages, but in a locality that lacks such natural advantages there should be built *kritrima* or artificial forts, that is, forts surrounded by artificial defences. The *Mānasāra* classifies forts into eight classes[52]: *śivira*, *bāhinī-mukha*, *sthānīya-droṇaka*, *saṁviddha*, *vardhaka*, *koṭaka*, *nigama* and *skandhāvāra*, each of which is further sub-divided, according to their locations, into several sub-classes: *giri-durga* or mountain fort; *vana-durga* or forest fort; *jala-durga* or water fort; *airina-durga* or chariot fort; *paṅka-durga* or marshy fort; and *miśra-durga* or mixed fort. A *giri-durga* is easily understandable. The *Śukranītisāra* defines it as a fort secure in its mountaneous position, with an ample supply of water in its rear in the shape of an undercurrent or spring.[53] Elsewhere we are told, the path leading to it must be narrow and steep. Hill forts have again been subdivided into three classes accordingly as they are built on inaccessible mountain top, on the slopes of a hill, or on a valley secluded by an encircling range of hills with natural passes, and hence not easily approachable. Curiously enough, all these three varieties of hill forts are to be seen in India of the middle ages, and they have come down to us as historical examples. The *jala-durga* of Śukrāchārya, in at least one type, may be the *antardvīpa-durga* of the *Devī-purāṇam*, that is, an island fort with water on every side, or in the midst of a sea or river. Another type seems to include those forts that are situated on a high land encircled by deep but stagnant water. *Deva-durga* is a fort by its natural circumstances, and that its entrances and exits are said to be guarded by gods, *rākshasas*, spirits etc. *Miśra-durgas* are combinations of *giri* and *vana-durgas*. The other varieties of *durgas* are self-explanatory. All writers of theoretical technical treatises seem to have been in favour of hill forts, no doubt for their obvious advantages, and also to lay emphasis on the fact that the most important item in fortifications was the relative invulnerability of the surrounding walls and ramparts. On this topic the *Devī-purāṇa*[54] says that water and mountain fortifications are best suited for defending populous centres, whereas desert fortifications, for a very sparse population. Generally speaking, there were four gates at the four corners of every fortified city, and Kauṭilya gives the names of the four principal gates of an average walled or fortified city, though some had more. These gates were sometimes provided with suspended bridges spanning the outer moat or moats. We read in the *Rāmāyaṇa*, for example, that at each of the gates of the walled city of Laṅkā there was suspended a gigantic bridge which evidently could be lowered down in position or lifted up as and when necessary.[55] Mediaeval Indian fortified cities have furnished many examples of such suspended bridges.

Some of the technical theoretical treatises, for example, the *Śukranītisāra*, give certain details of construction. The walls, according to this text, must be sufficiently high and steep as not to be easily scaled by enemies or robbers. They are to be uniform in depth and should have their foundation to the extent of one half or at least one third of their height. There should be well-fitted windows through which movements of enemies and brigands can be watched. The ditches are to be twice as wide as they are deep[56]. According to the *Mānasāra*,[57] all forts are to be surrounded with strong walls and wide moats; walls are to be made of brick, stone and other materials, and they should be 12 cubits high and their thickness at the base at least 6 cubits, and that there should be watch towers. According to the same text, there was not much of a difference between a large village and a city and a fort, a city being nothing more than an extended and expanded village, and any important city was almost always a fortified one. The only difference seems to have been that there were certain fortified cities which were chiefly meant for defensive purposes in the military sense, while an ordinary city or town with fortifications was meant mainly for the purpose of human habitation, and fortifications were necessary for purpose of protection from wild animals and robbers. Even such towns, or villages as a matter of that, grew out of agglomerated camps or settlements built originally for defensive or protective purposes.

What we know of forts and fortifications in ancient India from literary sources is also confirmed by what has been revealed to us by the excavator's spade.

We have already made references to the fortified cities of the chalcolithic period as well as to the hill-fortress, the *Jarāsandha-kā-baiṭhak* of Rājagṛiha. Excavations at Basarh, Kauśāmbī, Śrāvastī and Rājagṛiha as well as at certain other ancient cities, have clearly indicated that all these cities were surrounded by high walls provided with gates and encircling ditches.

The walled city of ancient Vaiśālī, modern Basarh, seems to have been situated on an oblong plateau, the longer sides of which ran almost directly from north to south. The height of the walls as extant at present, varies, but "it is generally 15 feet above the level of the ditch, near the ditch of a little less than 1 feet deep; the average height above the level of the surrounding fields cannot be more than twelve feet. The edges have a considerable slope, and there are no traces of the ramparts or the bastions, which Cunningham believes he has been able to discern. The ditch varies from 100 to 150 feet in breadth. An old embankment leads through the southern side of the ditch into the fort, which must mark an old high road. In the north-western corner of the fort are several small chambers."[58]

We are told by Megasthenes that the city of Pāṭaliputra formed an oblong 9⅓ miles by 1⅓ miles and was surrounded by a ditch 200 yards wide and a timber palisade with holes for the use of archers. Excavations at the site have actually revealed a double line of upright timbers, each about 15 feet high; a 14½ feet wide floor lay between the parallel lines which were covered over by a roof formed of cross timbers. These parallel lines have been traced for a considerable distance and appeared to the excavator to extend almost indefinitely.

Excavations at Taxila have laid bare still clearer indications of fortifications and fortified cities. It seems that during the so-called Indo-Greek period the city's fortifications were of hardened earth only, and embraced a much larger area than the later walls of stone. Sir John Marshall's work clearly revealed traces of these earlier fortifications a little to the south-west of the Jadial temple. The later walls of stone was presumably the work of the one of the early Śaka kings "who appears to have found the perimeter of the Greek city inconveniently large and to have contracted it by dismantling a line of buildings inside the city and carrying his new wall over their foundations, some of which may still be seen on the west side of the north gate."[59] This new wall, like all other Taxila structures of the period, is made of rubble masonry throughout and varies in thickness from 16 feet to 21 feet 6 inches. The wall, on the outside, is strengthend by solid rectangular bastions intended to protect the foundations, it seems. "The height of the walls and bastions was probably between 20 and 30 feet, and it may be assumed that the bastions were built in two storeys, of which the upper was doubtless hollow and loopholed. The walls between the bastions would also be loopholed above and provided with a terrace on the inner side for the use of the defenders . . . Against the inner face of the north gate, are some substantially built rooms evidently intended for the guards and on the opposite side of the high street are the remains of one of the camps by which the defenders could mount on to the wall. The gradient at the gateway must always have been a steep one, and as the level of the ground inside the city rose, it became steeper and steeper, necessitating the construction of a deep drain to carry off the rush of water."[60]

At Śrāvastī, Kauśāmbī and Rājagṛiha, the city walls built of brick and rubble can still clearly be traced, but since there have not been any systematic excavation to lay bare the base, and since the material was brick, it has not been possible to know the exact method of construction. But traces of city gates, towers and ditches are still easily discernible in each case. The evidence of the fortifications at Sisupalgarh has already been noted in a previous chapter.

Of early and late mediaeval fortified cities we have indeed a large number of extant remains, more or less in good state of preservation. We have also several epigraphic references to fortifications with their short descriptions, but since these do not concern the period under review they are not exactly relevant. Yet it is interesting to note that their evidence is more or less in a line with what we know from earlier sources, both literary and archaeological.

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60. Ibid—p. 79. The oldest occupational site at Taxila seems to be represented by what remains of the structures at Bhir mound. The lowest strata laid bare the ruins of rough stone buildings datable in about the sixth century B.C. The masonry is rough and massive in character which is in very sharp contrast with the neater and smaller masonry of the structures of the immediately upper strata datable in about the fourth century B.C. (Marshall, J.—*Taxila*, Vol. I, pp. 12 and 88, for more information on the dating of Bhir mound).

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CHAPTER SIX

PRĀSĀDA-VINYĀSA[1]

FROM the foregoing chapters it would be evident perhaps that the Indian cities of those by-gone days must have been diverse in character due to difference in the circumstance of their origin and growth. There were *nigamas* or market towns situated on trade routes and their important confluences; there were *pattanas* or ports, *droṇamukhas*, also sort of trade centres, *rājadhānīs* or capital cities, the seat of the royalty and central administration of a given region, *skandhāvāras* or camp cities, *kharvaṭas* or townlets, simple *nagaras*, and so on.[2] They were also of varied types and shapes: square or rectangular, lotus like or bow shaped, circular or elliptic and so on, and each with its own characteristic distribution of private and public buildings, palaces, markets, shops and streets etc.[3]

Buddhist and Jain texts as well as the Epics and the *Purāṇas* and such technical treatises as the *sūtras* of *Pāṇini*, the *Arthaśāstra* of Kauṭilya, the *Kāmasūtra* of Vātsyāyana and the *Milindapañha* introduce us to a very large number of ancient Indian cities, the identity and origin of which are in very many cases heavily mixed up with mythical and legendary tales. A large number of inland cities, emporiums of trade and coastal ports are also mentioned in such classical texts as the *Periplus of the Erythrean Sea* and the account of Ptolemy. An analysis of the meagre but varied descriptions of cities in these texts helps us reconstruct a more or less well-rounded general picture of an average city and its buildings. Despite difference of time and space and of the various conditions and circumstances of their origin and growth, there is a remarkable uniformity of character in all of them, which is mainly expressed through the types and forms of buildings that were resorted to by the city-dwellers. Indeed, city planning and architecture of those days as described in early Buddhist and Jain literature and as represented on early Buddhist reliefs, reflect very clearly the social and economic life of the people who reared them up. It is very clear that the richer people, the military and mercantile leaders, the king and members of the court and the nobility, the royal officials and men of their kind resorted to cities in very large numbers and perhaps almost exclusively. It was in response to the demands of their tastes, standards and aptitudes that the architects and craftsmen came to use their skill on private and public buildings.

Such buildings were known as *prāsāda*, *bhavana*, *gṛiha*, *niveśa* or *niveśana*, *ghara*, *antepura*, *vimāna*, *kuṭāgāra*, *harmya* or *harmīya* etc. The word *prāsāda* (Pāli, *pāsāda*; Prakrit, *pāsāya*) is frequently mentioned as denoting a mansion house, a palace, a pretensious building, usually in several storeys. When such palaces were used by the king, they were called *rāja-prāsāda*, *rāja-bhavana*, *rāja-niveśana*, *rāñño-nivesa* and so on. According to the *Uttarādhyayana Sūtra* of the Jains, the building of palaces (*pasae*), pretensious houses (*vaddhamāna gihāni*) and high towers (*balaggapottiyāo*) was the privilege of the *kshatriyas* alone. More often than not the terms referred to above seem to stand more for a group of buildings within an enclosure (*prākāra*) than a single building. The term *kuṭāgāra* seems to have been applied to a gabled mansion, self-contained and separately roofed, on any storey of the roof. The ridge of the gable was sometimes provided with finials which were called *udakaghaṭas* or water-pots (for example, fig. 40). Coomaraswamy after considering all relevant references and descriptions, seems to hold that the *kuṭāgāra* was a chamber with walls and having a ridged, barrel-vaulted, or domed roof, and that the *harmya* or *harmīya* (Pali, *hammīya*) was an open pillared pavillion with a flat or domed roof. *Vimāna* denoted a palace of the gods, hence a temple or an abode meant to serve religious purposes, and are therefore, outside the scope of this dissertation. *Gṛiha* and *Ghara* presumably stood for relatively humbler dwellings, not so pretensious, rich and elaborate as *prāsādas*, *bhavanas* or *niveśanas*. The *antaḥpura* or *antepura* was the private apartment of the palace of the king or the master of the entire establishment, where he was attended by the mistress and other ladies of the house; it was also called "guarded quarters" (*ārakkathāna*) where the male palace guards (*antepurapālaka*) kept watch.

Palaces or mansions were provided with a number of apartments and other constituents, depending on their elaboration and pretensiousness, as for example, inner apartment or bed room (*garbha*, *śayana-garbha*, Pāli, *sayana-gabbha*), drawing room (*avasthāna-gṛiha*), annexe (*upatthana*), audience hall (*prekshaka*), meditation chamber (*jhānāgāra*), image house (*patimā geha*), cells (*guhā*), sleeping room (*mohana*), toilet room (*prasādhana*), clothes or dressing room (*paṭṭaśālā*), latticed room (*jāla*), flower room (*kusuma*), painting room (*chitra, chitraśālā*), music-hall (*gandharva*), mirror hall (*ādarśa-śālā*), bath-room (*majjana*), pleasure bower (*alikaghara*), rooms or halls (*koṭṭhaka śālā*), etc. The ordinary separate rooms were usually called *gabbhas* or *garbhas*, *thānas*, *vasanatthāna*, and also perhaps *upatthāna*, but self-contained roofed apartments on any open floor of palaces and mansions were known by such names as *kuṭāgara* or *kuṭāgāraśālā*, *chaṇḍasālā*, *hammīya* and *sīhapañjara*. The floors and storeys were called *tala* or *niyyuha*, *bhūmika* or *bhūmaka*. One-storeyed mansion is *eka-bhūmika*, two-storeyed one *dvi-bhūmika*, and thus *ti-bhūmika* and so on up to *nava-bhūmika*; a many storeyed one is *anekabhūmika*. The main floor is *mahātala* or *vara-tala;* upper floor is *upari-tala*, top-floor *ākāsa-tala*, ground floor *āditala* or *hetthimatala*, mezzanine floor *ardha-tala*, second floor *dvitala*, third floor *tritala* and so on. A palace or mansion usually consisted of two distinct parts: the *hettha-pāsāda* or lower palace and the *upari-pāsāda* or upper palace which was reached by a flight of stairs (*sopāna, mahāsopāna*).

All cities were provided with a main street called *mahāpatha* or *toraṇamagga* (road leading to the main gate) or *rājamagga*, ordinary streets (*vīthi, antaravīthi*) and lanes and alleys (*patatthi, saṁdhibhuha*); street-crossing were called *saṁdhis*. Parks (*siṅghaṭaka*), squares (*chatukka*), market-places (*chachchara*) and drains (*niddhamanamagga*) were also important elements of an average city which was usually laid out in quarters (*bhāgasīmitam*), presumably according to castes and professions. Four gates facing the four cardinal points pierced the four walls (*prākāra*) of the palace enclosure; one of these gates served as the main gate or king's gate (*rāja-dvāra*) which was provided with a *bahi-dvāra-śālā* or *bahidvārakoṭṭhaka* or outer gate house that lay at some distance from the main palace. Passing through this gate one entered the open courtyard (*aṅgana* or *rājāṅgana*) or, in very large establishments, the first of a series of courtyards. Along the sides of this courtyard were situated the stables, gardens, tanks, temples, judgement halls etc.

Mansions and palaces stood on solid foundations or basements (*vatthu, vatthuka*) built of brick. On this basement usually, but sometimes also on the ground, stood the pillars of the lower floor (*hettha-pāsāda*) of the palace. Indeed, the joists (*tula*), jambs or ties (*saṅghāta*), girths (*bhittipāda*), roof-ridges (*kūṭa*), rafters (*gopanasī*), bondings of the walls (*pakkhapāsa*), and brackets (*mukhavatti*) were all bound to and supported by these pillars which were usually of wood. Well-cut octagonal columns (*aṭṭhaṁsa sukata thambha*) are specifically mentioned in one *Jātaka* story (VI, 173). In certain cases wooden pillars were supported by stone bases (*pāshāṇa-udukkhulaka*) with which they were fastened with the help of a kind of cement (*silesa*). How those holders (or bases), the octagonal pillars of wood and the lower floor or *hettha-pāsāda* looked like in general appearance and form, may be somewhat visualised in the open-pillared facades of the ground floor of excavated or structural *chaitya* halls. Indeed, the facade of an entire palace or mansion could not have been very much different from that of the facades of such Buddhist *chaityas* as those at Karle and Bhaja, Nasik and Bedsa, or at Khandagiri and Udayagiri in Orissa. It is perhaps permissible to argue that the open-pillared lower floor was enclosed on three sides by brick walls, the front being provided with an open-pillared verandah (figs. 42, 43, 44, 45, 47, for example), just as one finds in a *chaitya*-hall in western India. (See Percy Brown, *Indian Architecture*, Vol. 1, plate XXIIA, figs. 1 and 2).

It has been pointed out that all palaces were supported by pillars (figs. 38, 39, 41, 43, 44, 58, for example). Pillar in Sanskrit is *stambha*, *sthūṇa*; Pāli, *thambha*, *thūna*. Some palaces are described to have a thousand pillars, which may have been legendary exaggerations, but that there were many-pillared (*bahutthambhaka*) mansions cannot perhaps be doubted. Coomaraswamy cites the archaeological evidence of the *Lohapāsāda* and the *Ratnapāsāda*, both of Anurādhapura, in this connection, to show that the exaggeration had some basis to build itself upon. The walls of an average palace were plastered and were made to present a polished white surface, and on festive occasions marked with the auspicious sign of the spread hand (*hatthatthadi*; *pishṭa-pañchāṅgula*). In several *Jātaka* stories and also in Jain texts mention is made of *ekatthuṇaka* and *ekatthambhaka*, that is, of one-pillared palaces, for what purpose is not easy to say. That this was no fanciful description of a palace has been very ably argued by Coomaraswamy, especially in view of the fact that the super-structure of all palaces or mansions was built of wood and that not all palaces were necessarily of pretensious dimensions.

Pillars were used as supports not merely on the ground floor but on other floors as well wherever they were required to support a super-structure (figs. 43, 44, for example) which might be an *ardhatala* or mezzanine (fig. 48, for example) or *uparitala* or upper storey, an *alinda* or verandah, a *vedikā* or parapet, or a bay-window, and so on.

The ground floor of the *hettha-pāsāda* or lower palace provided rooms for the kitchens (*mahānasa*, *pāchanāgāra*), bathrooms with hot and cold water (*jantaghara*) and walls (*upadana*) etc. The floors of the ground floor were laid in brick, stone or wood; on the upper storeys they were invariably of wood. The terrace floors seem, however, to have been plastered. In later Sanskrit literature, as for example, in the *Harshacharita* as well as in Jain *Nayadhamma-kahāo*, reference is made to inlaid (*kuṭṭima*) floors. The living apartments all seem to have been situated on the upper floors (figs. 30, 32, 35, 40, 42, 43, 44, 82, for example).

The different floors of palaces and mansions were provided with flights of stairs, presumably of wood; but neither in the rock-cut *chaitya*-halls nor in the representations on bas-reliefs are such stairs or *sopānas* seen from outside. Obviously they were built in into the structures which could not be seen from outside. But in one instance at least (fig. 54), in a representation from one of the Mathura reliefs, one can find a covered staircase leading from one part of a palace to another. The head of the stairs was called *sopāna-śirsha*, or *sopāna-matthaka*; the foot, *sopāna-pādamūla*; the steps, *sopāna-kalingara*; the hand-rail or coping, *uṇhīsa*, the uprights, *thambha* or *thaba*; the cross-bars, *sūchi*, and the balustrades, *vedikā*. From these terms as well as from representations on the reliefs, the railings of the flight of stairs seem to have been constructed just like other railings.

There seems to have been always a main door (*kavāta*, figs. 78 and 81, for example) to the palace (*pāsāda-dvāra*, *rājaniveśana-dvāra*, *vimāna-dvāra*, *ante-pura-dvāra*. Figs. 41, 42, 53, 63, 65, 78, 81, for example) and this was usually guarded by a *dovārika* or a door-guard. The various apartments or *garbhas* of the palace were also provided with doors, for instance, we have references to *gabbha-dvāra*, *kuṭāgāra-dvāra*, *ratnaghara-dvāra*, (figs. 43, 44, 53, 56, 59, for example) and so on. The door-threshold was called *ummara*.

The names and character of the various apartments or *gabbhas* of the palace have already been referred to. According to the *Chullavagga* (VI, 3, 3) *gabbhas* were generally of three classes: (*a*) the *Sivikāgabbha* which according to Buddhaghosha was a square room, but representations of *śivikās* in early Indian bas-reliefs (fig. 37, for example), for instance, of Amaravati (Coomaraswamy, op. cit.), seem to suggest that they were much more elaborate; (*b*) the *nālikāgabbha* according to the same authority, was a long chamber two in breadth and three in length; and (*c*) the *hammīyagabbha* which was the same as the *kuṭāgāragabbha* or *mudaṇḍā-chchhādana-gabbha* on the *ākāsa-tala* or top-most storey. Reference is also made to *dīpagabbha* which seems to have been a lamp-niche provided with doors. *Pakuṭṭa* (Sanskrit, *prakosṭha*, Prakṛit, *paoṭṭha*) has been explained by Buddhaghosha as a *pariyāgāra* or a verandah or colonade all around a *gabbha*. Reference has already been made to the *kuṭāgāra* (figs. 40, 43, 44, 53, 55, 64, 65, for example) and *sīhapañjara*, two very important constituent of an average palace. Coomaraswamy's explanation of these two seem, from the evidence available to us up to now, to be the most plausible one.

Most of the apartments of a palace seem to have been provided with a deck or balcony, called *alinda* which was protected by a *vedikā* parapet (figs. 35, 40, 58, 64, 65, for example). *Pamukha* or porch or sort of verandah that Buddhaghosha speaks of, was also a kind of an *alinda*. Since the *alindas* were open to public view and at the mercy of the elements, they could be screened by movable curtains (*samsaraṇa-kiṭika* or *ugghaṭana-kiṭika*). One storeyed mansions were also provided with *alindas*, very much in the nature of porches, covered by over-hanging eaves (*osaraka*) of timber.

Windows (Sanskrit, *vātāyana;* Pāli, *vātāpana;* Prakṛit, *vada*) played a very important part in all sorts of city buildings, and they were indeed of large variety of shapes and forms, but all constructed in such a manner as could be closed and opened at will. But there was at least one form of *vātāpana* that had an arched top and a horizontal sil at the bottom and was provided with shutters (figs. 59, 60, 62, 63, 64, 67, 70, for example). Coomarswamy[5] has very ably shown that it was this form of window that later developed into the *gavāksha* of classical Sanskrit literature and the so-called *chaitya* or horse-shoe window pattern of later secular and religious architecture, Brahmanical, Buddhist and Jain. The same authority has also shown very convincingly that the *sīhapañjara* so frequently mentioned in early Buddhist literature, in connection with city-buildings, was "a balcony or bay window, perhaps a French window opening down to the floor level, forming the projecting part or end of a *kuṭāgāra* on the topmost or other open floor," and that "*pañjara* was perhaps so called because of its latticed walls."[6] Like ordinary windows, the *sīhapañjara* was something that could be opened and closed at will. Usually all windows were provided with shutters made like the *kavāṭas* of doors but perforated in different styles, principally latticed (*jālavātāpana*. Figs. 37, 56, for example) or grilled in rail-pattern (*vedikā-vātāpana*), or with vertical and horizontal bars (*śalākā-vātāpana*. Fig. 36, 79, for example. Blinds or curtains (*chakkalika, bhisi*) that could be rolled up, were also used. There were also blind windows, and one variety of such windows was called *uddha-chhiddaka vātāpana* which seems to have been a blind window with an opening above, "too high to look out of." The *vihāras* without windows, asserts the *Chullavagga*, were stuffy and unhealthy. Windows were there primarily for light and air, but secondarily, to look out of or to show oneself to the public without being fully before their gaze (this is very clear from the representations), as well as to go into or come out of the *tala* or floor external to the apartment.

Jain evidence as recorded in *Nayadhammakahāo*, would indicate that the pillars or columns of palaces were well-placed (*saṇṭhiya*) and polished (*masṛiṇa*), and carved with figures of *sālabhañjikās*. The outer walls were white-washed with lime or painted with red ochre, and then polished with stone (*ghaṭṭa, maṭṭha*). The interior chambers of a palace were elaborately painted (*pasotta-suvilihiya chitta-kamma*); the ceiling was painted with lotuses (*paumalaya*), and other flowers and creepers (*phulla-vallī-vara-pupphajau-ulloya-chittiya-tale*). The palace was provided with turrets or cupolas (*stūpikā*), perforated windows (*gavāksha*), pigeon-holes (*vidārika*), crescent shaped (*ardha-chandra*) steps, drains (*niryuhakantara*), terrace room (*chandraśālikā*), latticed chambers (*pañjara-śālā*) and trellises (*jālāntara*). The *avasthānagṛiha* or living room was of some importance in the palace set-up. Its pillars were carved with figures or *śālabhañjikās* in playful attitudes (*līlāṭṭhiya*).

Another Jain text, the *Rāyapaseṇiya*, furnishes us with elaborate details of construction of a special type of a palace called *yāna-vimāna*. The palace was provided with many pillars (*khambhas*), each elaborately carved and decorated, and the abacus of each representing carved figures of *vidyādhara* couples. It had three flights of stairs on three sides, east, south and north. The steps of the stairs were called *phalagani*, the coping and balustrade, *avalambana bahāo*, the uprights, *khambha*, the cross bars, *sūio*, the joints, *saṁdhi*, and the landing, *noma*. The staircases were provided with *toraṇas* with decorative jambs. Latticed windows (*jālikā* or *jālakaṭaka*) are also spoken of. According to this text the *Sudhamma-devasabhā* of which a representation occurs on the railings of the Barhut *stūpa*, was provided with four flights of stairs on the four sides, and at the centre stood the main palace (*mulaprāsādāvataṁśa*) provided with balconies. The *Sudhamma-devasabhā* itself was situated at the northeast of this palace; it had high columns and three doors on the east, south and north. Before these doors stood three pavilions (*mukha-maṇḍapa*) each provided with three vaulted doors on the north, east and south.

The *Rāyapaseṇīya* introduces us to a new type of building that presumably served as a theatre. This building stood within the compound of the *yāna-vimāna*. It was a fair size pillared hall furnished with high *vedikā* and roofed with a dome (*thūbhīya*). It was provided with an arena (*akkhaḍaga*) in the centre, in the middle of which was a platform (*maṇipiṭhikā*). Its walls were plastered inside and out and its gates surmounted by *kalasas* or water pitchers. "Seats were provided for the ladies of the palace in the cast, for the members of the executive (*abhintara-parisāe*) in the southeast, for the members of the 'middle assembly' (*majjhima-parisāe*) in the south and for the members of the 'outer assembly' (*bahyantara parishad*) on the southwest. Seven seats in a row were provided for the army commanders on the west; besides these there were seats for guards on all sides."[6]

Having summarised the evidence of literary texts in respect of city-buildings in general and their transcriptions in terms of actual architectural examples as represented on early Indian bas-reliefs, we may now proceed to do the same in respect of the construction of city-gates and ramparts that separated the *prāsādas*, *niveśanas* and other city-buildings from the country side.

The traveller coming from the countryside and wanting to enter the city crossed the moat or moats (*parikhā*. Figs. 63, 64, 65, 71, for example) referred to in a previous chapter, by a bridge (Pali, *saṅkama*, Sanskrit, *saṅkrama*) or an earthen causeway (*mṛitkūṭa*); such bridges or causeways were called *hastinakha* or elephant's nail.[7] Reaching the city gate (*dvāra*, *gopura*) he sees before himself the gate-house (*dvāra-koṭṭhaka*, *dalha-gopura*, *dalham-aṭṭāla-koṭṭha*, *dalha-gopura-aṭṭālakoṭṭha*. Figs. 63, 64, 65, 66, 67, 70, 71, for example) with its high towers (*dvāra-aṭṭālaka*, *gopura-aṭṭālaka*) and on both sides of him the city walls (*pākāra*) spread out. The walls, generally in one line but sometimes with re-entrant angles, stood on a plinth (*vaprasyopari prākāram*). Generally speaking, the walls were constructed of brick, but we have, besides the classical evidence of the wooden palisades and the archaeological evidence of the conduit walls of Pāṭaliputra, the testimony of a Sanchi relief representing the city moat, gate-house and bridge of the city of Kapilavāstu, that the walls were constructed of wood. Sometimes they were also made of earth (*paṁśu-prākāra*) as indicated in the Jain *Uttarādhyayana sūtra.* The walls were capped generally by battlements but sometimes by a coping, but along the cap-line there was perhaps a path wide enough to enable a horse gallop along,[8] called *pākāra-matthaka* (lit. the head of the *pākāra* or wall).

On the two sides of the city-gate there were two high towers, the *dvāra* or *gopura-aṭṭālaka* (fig. 66, for example) manned and used presumably for purposes of defence. Evidently they were reached by built-in staircases. The two towers are bridged together over the *śālā* or the great hall of the gate house, and stand on an even line with the *prākāra* on both sides (*prākāra-sama*). In front of the *śālā* is the approach or mouth (*mukha*) that leads from the bridge (*saṅkama*) to the *śālā.*

The basement of the gate-house was usually constructed of brick and it came up to the height of the level of the second storey of the gate-house (figs. 62, 63, 64, 66, 67, 70, for example). In many representations of gate-houses the ends of the beams supporting the second storey and its *vedikā* or railing, pillars and cornices can clearly be seen. The third or top-storey, called *uttamāgāra*, was provided with brick walls and windows (*mahā-vātāpana*), but was covered over with a barrel-vaulted roof (*chādana*) of thatch and surmounted by a line of *ghaṭas* or *kalasas* running along its ridge (*kūṭa.* Figs. 66, 68, 69, 70, for example).

Coomaraswamy has provided illustrations of a large number of city-gates and gate-houses of ancient Indian cities as represented on early Indian reliefs, and has fully explained their plan, elevation and construction with the help of descriptions and sketches.[9] It is not, therefore, necessary to go over the same ground in any further detail, but a certain systematisation of the details in their main outlines which has been attempted above, is perhaps called for.

The doors of the gateway, which could be opened and closed at will, consisted of a pair of heavy wooden panels, called *kavāṭas*; these panels were sometimes studded with iron or bronze knobs (*ayo-kammata-dvāra*) and usually turned on tenons above and below. The upper parts of the *kavāṭas* followed the line of the arched way (*toraṇaśiraḥ.* Fig. 85, for example), and the lower parts closed against heavy wooden plank placed horizontally; this plank was called *indakhila* or *indrakila* and formed the threshold. The *kavāṭas* were framed at the sides by heavy jambs of wood (called *esika*). For closing the *kavāṭas* and securing them against opening, they were bolted from inside with the help of one or two cross-bars (*palighā* or *parighā* or *aggala*) resting in slots fixed on the inside of the jambs or in the bolt-posts immediately behind the jambs. Such construction of gateway doors with similar *kavāṭas* and *indakhilas* etc. became the usual practice in India and was continued until very recent times.

Immediately behind the *kavāṭas* there was another large two storeyed *śālā* or hall on either of which there was one *pratimā-mañcha*, a platform for setting up images and portraits, it is presumed.

Besides the main *toraṇa* or arched gateway, there were also free-standing *toraṇas* "which are frequently represented (in the reliefs) as situated at the bridge-end remote from the city; through these arches one must pass when entering or leaving the city, but it is obvious that they served an ornamental and honorific purpose, and had no value for defence. In function they differ in no way from the *toraṇas* elsewhere represented, or extant as at Sanchi, as set up at the entrance to any sacred or honourable area or enclosure; and because they are taken for granted in this sense, and because they have no defensive value, we do not find them referred to in literature."[10]

In this connection Coomaraswamy[11] gives a fresh rendering of a few passages from the *Arthaśāstra* of Kauṭilya, which shows very clearly that what we knew from early Buddhist and Jain texts, is substantially corroborated (including the technical terms) by Kauṭilya, especially in respect of the gateway structures, as outlined above. It is true, Kauṭilya's description refers to the gate-house of a fort; but we have argued in a previous chapter that a fort and a fortified city were substantially the same. They are substantially identical and what applies to the one applies to the other as well.

The Jain *Aupapātikasūtra* contains a stock description of an usual early Indian city. There are also occasional references to various constituents of city buildings in such other texts as the *Achārāṅga*, the *Bṛihatkalpasūtra Bhāshya*, the *Rāyapasenīya* and the *Navadhamma Kahāo*. On the whole the descriptions are more or less the same as in early Buddhist texts, but Jain descriptions are more detailed and elaborate.

According to the Jain tradition the moats were cut deep and were broad at the top. The ramparts (*pāgāra* equal to *pākāra*) had a pronounced batter (fig. 66, for example) which is clearly to be seen in the representations of ramparts in early Indian reliefs. The batter was thus brought at the base gradually sloping upwards, the proportion of slope at the base, middle and the top being in the ratio of 1:½:¼. The shape of the rampart was curved like a cow tail or like a bow. It is said to have been provided with cornices (*kavisīsaya*) in circles, bastions (*aṭṭālaya*), paths (*chariya*), *gopura*, *toraṇa* and high roads deeply divided (*subhatta-rājamagga*). The rampart was also provided with gates (*dvāra*) on the four sides. The various constituents of the gateway-door included the gate leaves (*dadha-phalha*), bolts or bars (*indakila*), *aggala* or wooden pins or bars for fastening the door, slots for holding the ends of wooden pins or bars (*aggala-pasaya*) revolving tenons (*āvattana-pedhiyāo*), door jambs on two sides (*chheda, dvāra śākhā*), lintel (*uttarāṅga*) and closely fitted heavy door leaves (*nirantarīya ghana-kavāṭa*). The door leaves were sometimes divided into panels and furnished with round knobs at the joints or the *sandhis*. Sometimes the door leaves were decorated with *śāla-bhañjikā* motifs. The top portion of the arched door was sometimes constructed in cage pattern made of cross beams (*vaṁśa*) and rafters (*prativaṁśa*). The ceiling of the grand arched roof was made of cross-beams, carved beams (*vaṁsa kavelliyāo*), ceiling panels (*pattiāo*), mats (*ohandanīyo*) and straws (*punchanīyo*). The domed turret of the gate was provided with a pinnacle (*kuḍa*).

Moti Chandra has very ingeniously suggested that many of the architectural constituents and decorations mentioned in the Jain texts, have their lithic representations on the reliefs of Mathura belonging to the early centuries of the Christian era. Indeed, he points out "that the ornaments and the decorative motifs mentioned in Jain literature appear in greater number of Mathura sculptures than anywhere else, and on that basis we could say that the architectural data in Jain literature belongs to the 1st and 2nd century A.D., though some of the data based on tradition goes to much earlier period."[12]

REFERENCES

1. City palaces, mansions and other buildings as described in early Pāli, Prakrit and Sanskrit texts, have been very exhaustively dealt with by Coomaraswamy, in *Eastern Art*, Vol. III, 1931, pp. 181-205, and Vol. II, 1930, p. 209 f.n. His elaborate and often very minute descriptions have been supplemented very ably and carefully by Moti Chandra in his monograph on "Architectural data in Jain canonical literature", published originally in the *Journal of the Bombay Branch of the Royal Asiatic Society*, New Series, Vol. 26, Part II. What follows, therefore, in this chapter is an attempt towards co-ordination and integration of their findings from the point of view of the structural importance of all types of city buildings and the relation between their literary descriptions and their actual representations on early Buddhist reliefs. Since Coomaraswamy and Moti Chandra have furnished exhaustive references to original texts, no attempt is being made here to repeat the same.

2. According to the Jain *Bṛihatkalpasūtra Bhāshya*, *pattanas* were of two kinds: *jalapattana* and *sthalapattana*; so were the *nigamas*: *saṁgrāhika* and *asaṁgrāhika nigamas*. See, Moti Chandra—Architectural data in Jain canonical literature, in the *Journal of the Bombay Branch of the Royal Asiatic Society*, New Series, Vol. 26, Part II, p. 172.

3. Dutt, B. B.—*Town-planning in ancient India*, Chaps. VIII and IX.

4. *Eastern Art*, Vol. III, 1931, pp. 191-95.

5. Ibid, pp. 195-96.

6. Moti Chandra, op. cit. *Journal of the Bombay Branch of the Royal Asiatic Society*, New Series, Vol. 26, part II, p. 181. From a comparison of the architectural data in Buddhist and Jain canons, Moti Chandra concludes, and very rightly, it seems, that the architectural data in Buddhist literature is older than those in Jain texts. But the fundamental constructive elements in both are the same with but very minor differences; the Jain versions are only more elaborate and refer frequently to decorative and ornamental embellishments.

7. For an explanation of the term *hastinakha*, see Coomaraswamy—Early Indian Architecture, in *Eastern Art*, Vol. IX, 1930, p. 213, f.n. 9.

8. *Jātaka*, VI. 275.

9. Commaraswamy—Early Indian Architecture, in *Eastern Art*, Vol II, pp. 209-225, figures 1-17; A-C.

10. Ibid, p. 219.

11. Ibid, p. 219-20.

12. Moti Chandra—Op. cit., p. 182.

CHAPTER SEVEN

MATERIALS, METHODS AND TECHNIQUES

I

No account of early civil architecture of ancient India can be complete without a survey, howsoever brief, of the materials used and techniques evolved and employed by the builders of dwelling houses. As elsewhere, so here in this chapter too, we may begin with a study of the materials and techniques employed by some of the more important indigenous tribes of India, followed by references to materials and techniques employed in the rural architecture of India today with special reference to Bengal. It will be seen that so far as building activities in relatively easily perishable materials are concerned, there is a continuity of tradition from earliest times to the present day, both in materials and in techniques. And what is found in primitive tribal and contemporary rural practices as well as in the early texts themselves, is amply borne out by archaeological examples of civil dwellings as represented on the early Indian reliefs as well as by the very few examples of rock-cut edifices of pre-and post-Christian India, that have come down to us.

The house of an average Ao Naga consists usually of two rooms, a small one in the front at the ground level facing towards the top of the ridge along the sides of which Naga houses are usually built. The small front room leads to a large main room standing on bamboo piles. These piles which support the platforms are often very long, and as one passes along the back of a row of houses, one only sees a forest of poles supporting so many platforms above his head. The platforms are made of bamboo planking and the floor of bamboo matting, but the floor of the front room is often made of beaten earth. The walls are also made of split bamboo and bamboo matting and the roof is covered with thatching grass or palm leaves. "It is the front portion of the house which indicates the social position of the owner. Generally speaking there are three stages. A man who has given the first feast of merit extends his eaves; the second feast of merit entitles him to the use of posts while after the third feast of merit a western Ao Naga brings the roof of the front apse right down to the ground, converting the space in front of his house into what is practically an extra room. The house then closely resembles the *morung*."[1]

The Nagas depend on local resources for their building materials. The Ao and Sema Nagas employ bamboos for posts, beams and rafters, bamboo matting for flooring and thatch grass for roofing. Bamboo is sometimes employed in making the roof as well. Walls are always made of thin bamboos, split and pleated together. The Lhota Nagas also use the same materials. But the Angamis, and sometimes the Rengama Nagas, use wooden posts and planks. No nails are used for fixing; instead, the Nagas use cane or bamboo strips. Cane leaves and palm leaves are sometimes used for roofing purposes as well. At least one branch of the Naga, the Kalyo Kengu, uses slabs of slate for roofing purposes, since slate is locally available.[2]

The Garos usually build their houses on piles of bamboo, and if possible, on steep inclines, obviously for protection from wild animals. The roof thatched with grass, bamboo leaves or cane leaves, stand on posts of bamboo which is richly available in local jungles. The walls are made of matting of pleated bamboo.[3]

In an average house, the Santal uses nine posts which are fixed in the ground in three rows, three in each, those in the middle being higher than those on the two sides. A heavy bamboo pole, as long as the house is intended to be, is then fixed on the top of each of these three rows; cross beams are next set up, one end resting on the outside posts and the other being tied securely to the posts in the middle row. Next are put in position the rafters on each side of the roof, which are kept in place with the help of three sets of *bātās*, one set being tied at the top, one in the middle and the third at the lower, that is, at the eaves-end of the rafters. A framework of sappling or split bamboo is then placed on the rafters. This frame work is called *chātār*, evidently from Sanskrit *chhatra*, which is finally thatched over with strong thatch grass.

The walls of a Santal dwelling are made by placing branches of trees or split bamboos or reeds at very close intervals and by filling in and plastering over with clay or earth that has been made into a duff. Now-a-days, the earth duff is sometimes formed into large blocks and then they are placed in position, side upon side and fixed with the help of clay. The wall is then allowed to dry. In such cases branches or split bamboos are not used at all.

In construction of the roof the Santals today sometimes make use of small tiles made of burnt earth instead of thatch.[4]

An average Oraon house has four low side walls made of mud, on the four sides, with one opening or door-way on one of the sides, and a roofing of grass thatch. But the grass thatch has now-a-days been mostly replaced by tiled roofs in the central plateau; but in the more jungly areas of the west and south-west of the Ranchi district, thatched houses are still common and the walls are sometimes made of twigs and branches of trees plastered over with mud mixed with cow dung. The post, beams and rafters used in Oraon houses are usually made of *śāla* wood, so richly available in the local jungles. There are hardly any windows and rarely more than one door to a hut. Sometimes, a small lean-to type verandah is attached to the hut to serve as the domestic work-shop or as a cow-shed or pig-shed.[5]

In building their houses, the Mundas employ much the same manner as that of the Santals, and practically the same materials. Their houses are supported by wooden posts over which rafters and cross-beams, either of bamboo or of *śāla* wood, are laid and the roofing is given with *sauri*, a kind of grass locally available in plenty. In modern times, the richer Mundas make use of tiles in roofing their houses. The walls are usually of solid wattle, but sometimes, especially in the western areas, walls are made also of split bamboos covered over with mud. For ropes for fastening of the beams and rafters or for keeping the split bamboos in position, the Mundas use the fibre of a creeper growing wild in the local jungles. Occasionally they also use hemp for the purpose.[6]

The traditional dwelling of the Chenchus are of round shape with a conical roof; the walls are built of earth duff which when dried in position, becomes a solid wattle wall; the roof made of rafters and cross-beams of split bamboo is laid over with grass or thatch. In modern times and in certain areas, the Chenchus have given up the round shape for the rectangular like those of the local Telegu peasantry. The walls are painted in red and white in the typical Telegu manner. Materials used are thus bamboo, grass, thatch, cane ropes and mud.[7]

The Todas build their houses with practically no post standing vertically. Their huts measuring usually 10 feet high, 18 feet long and 9 feet broad, consist of two series of pliable bamboos fixed in the ground along two lines with about 9 feet in between. These bamboos fixed close to one another, are then bent at the top at a height of about 10 feet, so that the roof and the walls become one and take the form of a barrel-shaped vault slightly conical towards the top. Another series of bamboos, split or holed, are then closely laid across and kept in position with cane ropes or fastening of rattan. This conically vaulted roof is then covered over with thatch placed in position in a stepped manner. All houses are supposed to face east, where lies the main entrance. The back and the front are walled up with wooden planks in three sections. The front or the entrance side is pierced by low rectangular door in the lowest section through which the inmates of the house are supposed to crawl in. In one side or at the centre of the middle section of the entrance, there is a rectangular piercing serving as the only window. The more important materials used by the Todas are thus bamboo, swamp grass, thatch, cane ropes and sometimes planks of wood of *kundi*, *nag* and *pulli marams* (trees), all of local origin.[8]

II

Having given a rough idea of the building materials, methods and techniques of a few of our more important indigenous tribes, we may now try to get an idea of what the texts—early Sanskrit, Pāli and Prākṛit, i.e., Brahmanical, Buddhist and Jain—have to say on the subject under discussion.

From the reference to *Tvashtā*,[9] it seems that the Ṛig-Vedic architect was pre-eminently a carpenter, and he seems to have used wood as his principal building material. There is, however, one reference in the *Ṛig-Veda*, a reference to the hundred cities made of stone (*asmamayasī*),[10] but these cities seem to have belonged to the *dasyus*, which Indra is said to have destroyed and thus earned the title of Purandara.[11] The *Atharva-Veda* seems to suggest that the most common building materials were bamboo and thatch. From a reference to the consecration of a newly constructed house, it appears that the house of the Atharva-Vedic Aryans was built mainly of bamboo, thatch and wood and stood in the midst of a walled-up enclosure.[12] The upright or vertical pillars on which the roof rested, were called *upamit* and the cross-beams, *parimit*. Against the upright posts the beams were fixed at angles, as props or *pratimit*.[13] The roof seems to have been formed with split bamboo and thatched with straw or with mats of reeds.[14] Macdonell and Keith seem to suggest that the "roof was wagon-headed like the huts of the Todas."[15] But this seems to be doubtful, since the relevant text speaks of *visuvant* or a ridge, in which case the wagon-head shape of the roof is ruled out. The sides of the house, that is, the walls are called *plaksha*, and the door with its framework was called *ata*.[16] A Vedic house not only held the family but also its cattle, including sheep.[17] The entire house could be securely shut up and was composed of several rooms. In connection with the house mention is made of four terms "which though primarily sacrificial in meaning, seem to designate parts of the building:—*havirdhāna* (oblation-holder), *agniśālā* (fireplace), *patninam sadana* (wives' rooms) and *sadas* (sitting room)."[18] One interesting side-light is thrown by the fact that slings for hanging vessels (*śikya*) are mentioned in the *Atharva-Veda*,[19] a practice which is still very common in the villages. The *Atharva-Veda*, describes the house as covered with grass and clad with straw.[20] Nails of bamboo and wood and cane ropes also seem to have been used for fixing and fastening. Since the houses were mostly built of wood, bamboo and thatch etc., they were evidently very easily inflammable. In fact, we have innumerable prayers of the Atharva-Vedic *ṛishis* against ravages of fire, which consume these houses in no time.[21] The accumulated evidence on this point, of the *Gṛihyasūtras* as referred to elsewhere, also seem to support the integrated evidence of the *Ṛig-Veda* and the *Atharva-Veda*. There, that is, in the *Sūtra* literature we are told that the upright posts were all of wood, but there is evidence to suggest that bamboo thatch was also used.

More elaborate references to materials and occasionally to the techniques employed are however, to be found in Pāli *Jātaka* literature. Many of the relevant *Jātaka* stories refer to huts of leaves and branches of trees.[22] Evidently the majority of the houses in the villages and the huts of hermits were built of such materials. Wood also was commonly used, especially for the posts, the most common wood being of the fig and *śāla* trees.[23] There is at least one *Jātaka* which seems to suggest that the walls were plastered and then white washed.[24] In the *Jātaka* stories there is reference to writing on the walls. The principal binding material was cane.

The *Jātaka* texts also contain reference to houses in which wood was more extensively used. One story[25] refers to carpenters who used to shape beams and planks for house-building and put them together to make the framework of the houses. In another story,[26] a carpenter is said to have built a public hall; there he is described as seasoning the "pinnacle wood". In another story,[27] a carpenter is described as looking about for a tree that would serve the purpose of replacing the old pillars of the palace of a king, by new ones. Still in another story,[28] the columns of the palace of a king are described to have been shaped and designed out of tree trunks. For larger and more substantial constructions, the wood of the *śāla* and *śiṁśapā* trees seems to have been preferred.[29] There is at least one story which makes references to a dome of iron, but the use of this material does not seem to have been very common.

It is perfectly clear that bricks, both burnt and unburnt, were also used in certain cases, especially in the towns and cities. Reference to bricks as an important building material are made in the *Śatapatha Brāhmaṇa* and in the *Sulva Sūtra*, for example.[30] The *Vinaya Piṭaka*, one of the early canonical texts of the Buddhists, refers to the Buddha's permission to his disciples that they might use bricks in the basement of the halls, stairs and roofings of more substantial buildings and palaces.[31] At least in one *Jātaka* story,[32] mention is made of *śilāmaya pāsāda*, that is, a palace made of stone. Two other stories[33] refer respectively to crystal palaces (*pāsāda*) and crystal towers (*vimāna*). But such references may be figurative and imaginary.

By piecing together the scattered information of early Pāli and Prākṛit texts supplemented by early Sanskrit ones, it is somewhat possible to get some further idea of materials and techniques of early Indian architecture. We have already seen that the architect was called *vaddhakī*. Reference is also made in the *Mahāvaṁsa* (LXXXVIII, 106, 107) to *iṭṭhika-vaddhakī* or brick-architect, or one who works in brick, *chuṇṇa-vaddhakī*, that is plaster-worker, *dāru-vaddhakī* or worker in wood and timber, and *śilā-vaddhakī* or the architect who worked in stone. The wood-carver and the stone-sculptor are known as *tacchaka* (Sanskrit, *takshaka*, for instance, in *Milindapañha*, 413). Various tools were used in building work, namely *vasi* or adzes, *nikhakana* or chisels, *muggara* or hammer, *sūtta* and *kāla sūtta*, that is, measuring thread, *khanuka* or wooden pegs etc. Smiths are called *kamāra;* painters and decorators are known as *chittakara*; and craftsmen or workmen in general were perhaps known as *kammakāra*. The *Jātakas* make mention of the fact that eighteen guilds (*seṇī*) of craftsmen are usually employed in building a new city, and that all of them work according to the traditions of their respective craft (*sippānurūpeṇa*).

The Jain *Bṛihatkalpasūtra-Bhāshya* has significant evidence to offer in connection with early Indian building activities. It refers to rafters (*paṭṭhivaṁśo*), joists (*dharaṇu*) and posts (*mūlavelīto*) which are required for building an ordinary house.[34] After the main framework is built, in which the materials used include bamboos (*vaṁśaga*), straw mats (*kadano*), wooden planks (*ukkanchaṇa*), thatched grass (*chāvana*), the ground is levelled and walls and doors (*duvāra*) are made, and finally the walls are plastered (*levana*) and white-washed (*dūmiya*).[35] Before the prospective inmates of the house take its possession, it is fumigated, perfumed with flowers, and then painted and swept before the proper sacrifices are offered. Besides bamboo, wood and grass, the same text makes mention of stone and burnt bricks as building materials.[37] But *kāniṭṭa* or *lohamaya ishṭaka* which stands for stone, is not very likely to have been used extensively as will be evident from the fact that buildings wholly made of stone are not elsewhere mentioned. Stone as a building material for dwelling houses do not seem to have been used except for doors, lintels, corner pieces etc., in combination with bricks which seem to have been used much more extensively, almost as extensively as wood, at any rate for more elaborate and substantial buildings. Open places were also provided for both at the front and at the back.[38]

Jain texts give us some indication of building techniques as well. In speaking of city-gates, the *Rāyapasenīya Sūtra* says that they were provided with landing or *nema*, pedestal or *pratisthāna*, pillars or *khambha*, threshold or *eluka*, bolt or *indakela*, side-frame or *cheda*, lintel or *uttaraṁga*, small door-bolt or *sūchī*, joints or *sandhi*, wooden bars for bolting the doors, or *aggala* holes for the ends of the wooden pins, or *aggala-pasaya*, revolving boards or *āvattana-pedheyāo* and closely fitted heavy door-leaves or *nirantarīya ghana-kavāda*. The door leaves were divided into panels furnished with globular bosses (*bhitti-gulita*). The elevation of the door was called *usscha* and the pinnacles were called *kuḍa*. The balcony (*bhoma*) was made of cross-beams (*vaṁśa*) and rafters (*prativaṁśa*).

Pāṇini seems to indicate that the villages consisted mostly of *kūṭīs* or individual houses and *kuṭīras* or peasant cottages made of bamboo, reed and straw. That such cottages were roofed with thatch grass will be evident from the phrase *chhādisheya tṛiṇa*. Every house seems to have been provided with *dvāra* or doorway which was opened or closed with a pair of *kapāṭa* or leaves. The closed doorway was secured by a bar drawn across from inside; this bar was called *parigha* or *paligha* which presumably meant either an iron or wooden bolt.[41] In one place Pāṇini speaks of *kapāṭaghna chaura* or burglars who used to batter against the leaves of a doorway to gain entrance into the house.[42]

Pāṇini also refers to brick as a building material; this is hinted at by the phrase *ishṭaka chitā* or a funeral pyre made of bricks.[43]

The grammarian refers also to a number of forms of buildings that are usually found in a big city, namely *geha* or *gṛiha*,[44] that is ordinary houses, *nivāsa* and *nikāya*,[45] that is residential quarters, *nisadya*, perhaps meaning rest houses,[46] *koshṭāgāra*[47] or store-house, *sabhā*,[48] that is council or meeting halls, *śālā*, residential halls or granaries or sheds for cattle (*gośālā*),[49] also for asses and mules (*khara śālā*).[50] The words *āgāra*[51] is several times mentioned by Pāṇini; presumably it meant any large building or hall with several parts. *Āgāras* were built for various purposes as will be evident from such terms as *bhāṇḍāgārika*, *devāgārika*, *koshṭhāgārika* etc. In one *sūtra* at least Pāṇini speaks of *eka-śālika*;[52] it is not very easy to say what he actually meant by the term, but it is not unlikely that a shed of the lean-to type is indicated.

Kauṭilya in his *Arthaśāstra* gives us some idea of the building materials of his time. He does not seem to speak of any building wholly made of stone, not even the palaces of kings. But he seems to suggest that stone was used to make the sides of the ditches and underground chambers as well as in the construction of city walls.[53] Much more extensive, however, was the use of bricks. The side walls of the buildings within the forts are said to have been constructed of brick; similarly the treasure house and the palace are described as *aishṭaka*, that is made of bricks. The store houses and pillars were made of burnt bricks.[54]

The evidence of Kauṭilya is directly supported by the evidence furnished by classical sources. Arrian states that, "cities on the banks of rivers and and other low lying spots were built of wood; those in more commanding situations where they were less exposed to floods, were made of mud and bricks."[55] For all that we know from archaeological evidence, the palaces of Chandragupta and Aśoka Maurya were also very largely made of wood, and it was perhaps only in the audience hall that stone pillars were used.[56]

Kauṭilya, however, seems to indicate that the materials used in house construction in the villages and in the outlying areas were simply bamboo, reeds and thatch. The walls of such houses were constructed of split bamboo interwoven with reeds and plastered over with mud. Roofs were covered with mats (*kata*) and straw.[57] Timber was only occasionally used in the villages, and that too only in more substantial and pretensious buildings. Kauṭilya, like Vātsyāyana, seems to have been a city-lover and does not seem to have a very great admiration for the villages. In any case he was not in favour of having houses made of bamboo and straw within the city walls, presumably for fear of fire. There is one instance where he recommended pulling down a mat and thatch covered house standing by the side of a more substantial building.[58] According to Kauṭilya, each house had an *ani-dvāra* or gateway and a boundary wall.[59] Windows were small and had to be raised high up on the walls.[60] A special rule laid down by Kauṭilya, was to ward off the evil consequence of rain, but how it was done, that is, the method of construction is not explained by him.

The evidence of the *Rāmāyaṇa* and the *Mahābhārata* is difficult to use in this connection, since most of the facts furnished seem to be legendary and hence more imaginative than historical. In the *Rāmāyaṇa*, for example, the use of crystal and other valuable materials are often alluded to.[61] Indeed, lavish descriptions are given of jewel windows, crystal floors and walls of gold and silver. Similar descriptions occur in the *Mahābhārata* as well. Occasional use of crystals and glasses and coloured stones may have been made by way of decoration,[62] but it is very doubtful whether they had any constructional significance. While the *Mahābhārata* refers to the use of bricks in the construction of altars,[63] the *Rāmāyaṇa* makes mention of the same material for the construction of the sacrificial halls.[64] Both the epics speak of stone structures as well, but the practice seems to have been very infrequent and may not altogether refer to ordinary dwelling houses. For once at least, the *Rāmāyaṇa* speaks of pillars of stone,[65] but whether these pillars have any constructional significance or not, is not very clear. The *Mahābhārata* seems to suggest that the walls of buildings were plastered and white-washed.[66]

Kālidāsa's works, though belonging to the category of imaginative work, are more objective from our point of view. It is true that his descriptions of buildings and building materials are mostly in connection with royal palaces and cities. But within this limitation, he gives us a complete picture of the architecture of his time. Beginning with the main road, which is called the *rājapatha*,[67] which presumably crossed the town and connected it with other cities, he makes mention of the market place[68] in the centre of the city and big houses flanking the *āpanamārga* or market street on both sides.[69] The capital city or any rich city abounded in high mansions and lofty palaces, white washed and provided with terraces and buttresses.[70] Royal palaces had inner apartments;[71] most of the buildings had more than one storey and were provided with attic rooms,[72] arches,[73] balconies, courtyards, terraces, verandahs, council halls[74] etc. Every city was provided with outer walls or *prākāras*[75] and lofty gates called *gopuradvāra*;[76] a deep ditch encircled the ramparts.[77] Kālidāsa also refers to repair and rebuilding of cities by the guild of architects or *śilpī-saṅgha*.[78]

Besides the royal palace, the poet refers to two classes of buildings, *saudha* and *harmya*.[79] Both seem to have been very lofty buildings and were presumably built of brick and plastered over and white washed with lime water. Stone also seems to have been in occasional use and perhaps also marble and *manaḥśilā*,[80] presumably in rich costly houses. Roofs were generally sloping and this slope is known as *valabhī*.[81] This term has been variously explained in the dictionary; it is, therefore, difficult to say in which sense Kālidāsa used the term.

Certain architectural technical terms that one meets with in earlier literature, both in Sanskrit and Pāli, are met with in Kālidāsa's work as well; for example *toraṇa*[82] which usually stood for the outergate of the palace or city or an arched gateway or an arch of the terrace or balcony, *alinda*,[83] which was a balcony, usually decorated with an arch; *aṭṭa*, which meant turrets and *talpa*[84] standing probably for attic rooms; *ālokamārga*[85], that is, an window which admitted light in the building; *vātāyana*[86] which stood for another kind of window; *gavāksha* was probably of the shape and form of the cow's eye;[87] *jālamārga*,[88] which was the name of still another kind of window, fitted with a frame containing a net work of either wood, or stone, or metal or plaster with air-holes in it.

A building of an ordinary house-holder was, according to Kālidāsa, called *bhavana*[89] and consisted of a courtyard surrounded by four walls. Inside of the walls there were interior rooms[90] standing alongside the walls; we read of bed-chambers, fire-chambers, store-rooms,[91] sports-rooms[92] and *garbha-veśma*[93] which perhaps stood for the house sanctum. Every house was provided with many windows,[94] which opened out on the street. It was also provided with gateway or *toraṇa* below which was the threshold, called *dehaghī*.[95] Huts made of bamboo, thatch and leaves were known as *uṭaja* or *parṇaśālā*.[96]

According to Vātsyāyana, a house was divided into two parts, the inner and the outer. The inner belongs to the ladies, and the outer to the master who attends to his business there. Each house contains a number of rooms used for different purposes. A garden (*vṛikshavāṭikā*) with wide ground is attached to the house. We find in the *Kāmasūtra* the mention of *harmya* and *prāsāda*, the walls of which were so magnificently decorated and beautifully polished that a girl could see her image reflected in it. The houses were built on pillars or *stambhas*.[97] In the *Buddhacharita* we find mention of an iron pillar.[98] The *Saundarānanda kāvya* speaks of a pillar of gold.[99] The floors were finished in some sort of mosaic or with precious stones.

In this connection reference may be made to the evidence furnished by the Pāli *Chullavagga* in respect of the constituent elements of the house of a substantial *gahapati*. Such a house consisted of living rooms, retiring room, store room, service hall, fire place, store houses, closets, cloisters, wells and well-sheds, bath rooms, ponds etc.[100] The *Mahāvagga* also contains a similar reference, including one *yantra gṛiha*[101] the purpose of which is not easily intelligible. According to the *Chullavagga*, the verandahs and terraces seem to have been special characteristics of such buildings. Indeed, the Buddha is said to have allowed the bhikshus, the use of "covered terraces, inner verandahs and over-hanging eaves."[102]

III

The evidence of literature, of which the barest outline have been furnished above, is not only amply borne out but explained in greater detail in visual form by archaeological evidence datable from about the 3rd century B.C. If this is true in respect of building materials it is doubly so in that of building techniques. These archaeological materials include the large number of rock-cut *chaityas* and *vihāras*, mainly of western India, Bihar and Orissa, railings and gateways of such *stūpas* as those of Barhut, Sanchi, Bodhgaya, Amaravati and Nagarjunikonda, countless bas-reliefs on *stūpa* railings and gateways representing buildings of different forms and types, and at least one epigraphic record, namely the Sohagaura copper plate of about the second century B.C. In these materials one would also find ample corroboration of the brief account of contemporary civic architecture of India furnished by the classical writers. On the gateways of Sanchi, as backgrounds to various contemporary events of the times of the Buddha and Aśoka, one sees representations of portions of such cities as Kapilavāstu, Uruvilva, Rājagṛiha, Banaras, Śrāvastī, Kuśīnagara, etc. Recent excavations at Amarāvatī have yielded atleast one sculptured slab representing the Jetavanārāma and the *stūpa* at Barhut. As one scans the buildings represented, one can easily visualise what the city of Pataliputra with its massive fortifications, was like, and how near the truth the description of Megasthenes was.

These materials leave no room for doubt that even in the bigger cities wood must have been for centuries the most important building material, not only for the buildings themselves, but also for ramparts, gateways etc. Dharmapāla, the celebrated Buddhist commentator, refers to an architect named Mahāgovinda who is assignable to about the 5th century B.C. and is credited with having planned and laid out several of the capitals of northern India of his times.[104] The skill of Indian carpenters is evident not only from what scanty account Megasthenes has left us, but also from what has survived of the wooden construction of the palace of the Mauryas.[105] From these remains it appears that for the support of the foundation of the façade of the palace, sort of raft was made with the help of a number of massive teak wood platform, each 30 feet in length. Each platform was composed of beams joined together with skilful precision. Indeed, in the construction of these platforms there is a perfect example of the joiner's and the carpenter's art.

What this art was like and what its technique, is exemplified fully by the rock-cut monuments of the centuries immediately preceeding and following the Christain era. These rock-cut *chaityas* and *vihāras* are only faithful translations in terms of stone, of the early form of timber constructions. The wooden originals have perished, but their facsimilis are preserved in the live rock so that the full account of early Indian carpenter's and joiner's art are on record. The rock-cut monuments of such place as Kondane and Karle are cut out of the face of the live rock and consist of a *chaitya* hall with attached monastic cells representing respectively an edifice arched over by barrel-vaulted roof and a number of cells with flat roofs. From the construction of the arched *chaitya* window of the façade and of the interior barrel-vault, it is perfectly clear that wood was the principal material of construction. The arched vault was supported by rows of pillars running along two sides and the structural membering of the vault was supplemented by a series of carved wooden ribs or groins placed in close order. The flat roofed edifices were also rested on pillars supporting the wooden groins, above which beams and joists were placed and joined. The technique of joining does not show many varieties; indeed, it is very simple and follows the same principle as carpenters follow even today. Wherever pinning was necessary bamboo pegs were inserted. The great arched window which admits light into the vaulted hall through its tracery, also shows very clearly its wooden origin. The *chaitya* hall at Kondane shows that the smaller rooms were lighted by means of latticed windows made of bamboo; from other instances of similar *chaityas* we know that the entire balcony was nothing but a network of pleaated bamboo strips held together on wooden framework. From what has been preserved in stone in these *chaitya* halls and *vihāras*, it seems that the timber used was of the best quality and was carefully trimmed and polished into the required shape and form with appropriate instruments. To such an extent was the wooden prototype copied that in some of these *chaitya* halls the pillars are inclined in such a manner as is called for only in wooden construction in order to counteract the outward thrust of the heavy timber roof.

If the rock-cut *chaityas* and *vihāras* of western India referred to above, reveal very clearly the use of wood in general building construction and also some of the techniques, the structural railings and gates of such *stūpas* as those of Barhut and Sanchi also show that the techniques employed were nothing but those of wooden prototypes translated in terms of stone. "The shape and more particularly the joints of the railings", says Percy Brown, "are those usually employed by carpenters as may be seen in the tenons of the uprights (*thaba*), and the scarf jointings of the copings (*uhṇīsa*), neither of which are methods appropriate for stone bonding. There is also the peculiar form of the triple crossbars (*sūchī*), the lenticular section of which was obviously derived from the bamboo rails of the village stockade. It is evident, therefore, that these typically early Buddhist structures were produced at a very formative stage, a phase not so much in the evolution of the craft itself, as in that of the craftsman who made them, at a time when his mind was still thinking in wood, although his hands were working in stone."[106]

But, if wood was the material for richer and more substantical construction, reed, thatch and mud must have been the more common materials for humbler dwellings. In Bihar, in the Barabar, the Nagarjuni and the Sitamari hills, there is a series of caves or rock-cut sanctuaries, intended presumably for Ājīvika monks, and datable, as can be surmised from the technical treatment of the carving and enamel-like polish of the surfaces, to the Mauryan culture-period. The two most notable of these caves, from our point of view, are the Lomasa Rishi and the Sudama caves (figs. 72, 73, 74) on the Barabar hills. A glance at the façade of the doorway of the Lomasa Rishi would show immediately that it is nothing but a reproduction in stone of the gable-end of a wooden structure. The two inclined uprights, the joining of the two principle and other subsidiary parallel rafters with the upper ends of the uprights, the carved roof composed of three laminated planks etc., all prove that the stone-cutter has employed in every detail the technique of the carpenter. Another glance at the Sudāmā cave would show how a humbler structure was roofed with thatch, and walls on all sides by thick mud walls as well as wooden planks. Here one can see how the slightly overhanging eaves of thatch and straw, the wooden planking of the walls, the door with slightly inclined sides and thick mud wall were all faithfully copied in terms of hewing of of live rock.

Having discussed from our point of view, the actual extant examples of early Indian rock-cut monuments and noted what they have to offer in terms of materials and techniques, we can now proceed to a richer and more fruitful source of archaeological evidence, namely, the representations of secular buildings in early Indian relief sculpture. These buildings are of various types, shapes and forms which have already been described in two previous chapters. The materials used include clay, leaves of various trees, thatch, bamboo, wood, tile, brick and in certain cases at least, also blocks of stone.

An analysis of the various building types and forms represented in early Indian reliefs shows that in the more humbler dwellings, situated presumably in villages and outside the city walls or in the outskirts of the forests, the plinths were usually made of clay or beaten earth, which is so often the case even today. In respect of the *parṇaśālās* or leaf-huts the walls too seem in most cases to have been made of the same material, that is, clay (figs. 1, 4, 5, 6, 8, 10, 12, 14, for example) which may have served either as binding plaster inside and out of a core made of reed, bamboo or branches of trees, or clay wholly, mixed with such adhesive materials as cow-dung, husk etc. In the latter case, it may safely be presumed, the wall must have been fairly thick. In certain other cases, the walls were made of split bamboo pleated horizontally and vertically (figs. 7 and 11, for example). There are at least two examples where straight, even-sized bamboos placed vertically, one close to the other and held together with the help of one or more horizontal bands of bamboos (figs. 2 and 13, for example), were used. The doors are in almost all cases rectangular, opening through the thickness of the wall. From at least one example (fig. 6) it seems that the doors were provided with two leaves (*kapāṭa* or *kavāṭa*), a fact which finds additional support from atleast two representations on the Begram ivories (figs. 78, 81). In the latter instances, the doors are embellished with designs and provided with bolts. The windows are placed somewhat high up on the walls. In the majority of cases they are just rectangular in shape (figs, 10 and 27, for example); in others the top and the bottom sides have convex and concave curves (figs. 24 and 25, for example). In some cases, the windows are provided with vertical bars (fig. 10); in others, vertical and horizontal bars crossing each other; still in others bars are placed diagonally in a net-work pattern (figs. 27 and 37). Technically, windows that were provided with bars were called *śalākā-vātāpanas*.

The roofs, however, of even the humbler dwellings were not only of various types and forms, but were made of various materials as well, which are often worked out and arranged in nice repetitive patterns (figs. 1, 3, 4, 9, 10, 11, 12, 13, 14 etc.). In the *parṇaśālās* various kinds of leaves seem to have been used. But everywhere, it seems that they were worked out in a pattern on bamboo and reed framework. The most common leaves used seem to have been those of *śāla*, coconut trees, palm trees etc. (figs. 1, 3, 4, 5, 7, 10, 11, for example). Grass and thatch seem to have been commonly used, for instance, in figures 7, 10, 22, 23, 24 and perhaps also in 26. It is not unlikely that in certain cases at least the leaves were cut in more or less uniform size. There are at least few cases in which roofing was done by half-rounded terracotta tiles, for instance, in figures 28, 29 and 51. Flat tiles also seem to have been used (fig. 61, for example). From the representations themselves it is difficult to determine, in respect of certain cases at any rate, whether the material used was leaf cut to rectangular sizes or it was flat tile or slate (figs. 2, 12, 13, 14, 30, for example). In respect of figs. 2 and 12 and perhaps, also 13, it can be presumed that the material used was large-size leaves cut to requirements. But it is not altogether unlikely that slate or flat tile was also used. In almost all sub-Himalayan region today slate is extensively used as an important roofing material, and tile throughout the Gaṅgā-Yamunā Valley. In many cases even the *parṇaśālās* and tiled buildings were provided with pinnacles of various shapes and forms. In certain instances at least, so far as sculptural representations are concerned, it is difficult to say whether the forms and shapes indicated were not more imaginary than actual. From the representations themselves it seems that they were somewhat decorative, as for instance, in figs. 15, 16, 17, 18, 19 and 21. Also they seem to be simulations of wooden construction. It has been already indicated that all roofs, whether barrel-vaulted, round or curved, were supported on a frame of wood or bamboo, placed on the cross-beams. This is actually illustrated in at least one representation (fig. 10).

In respect of the building activities as current among the tribals and in the villages all over India, the materials most commonly in use and the techniques usually employed are those that have been described above. This will be evident from the sketches of tribal houses and village dwellings, (figs. 82-101)

Of representations of richer dwellings, mostly buildings in fortified cities, we have a good many in the early Buddhist and Jain reliefs. A glance at the sketches made from such representations would reveal that wood was the material *par-excellence* of all such buildings. Next in order of importance was brick, and perhaps in a few instances, blocks of stone for purpose of rampart walls, though from the representations themselves and from the method of construction indicated, one cannot be too sure whether stone was used so extensively. For roofing purposes tiles seem to have been in use at least in a few cases (figs. 51 and 61, for example). The barrel shaped or curved roofs appear to have been built in simulation of those of wooden structures and were perhaps constructed of wooden planks covered with stucco-plaster. But at least in a few cases the roofing material must have been something like thatch or straw, which for the sake of protection against heavy wind and rain was fastened by diagonal bands of split bamboo. This will be evident from the sketch of the building in figure 52.

An analysis of the shapes and forms of the buildings themselves, from their plinths right up to the pinnacles on the roof, namely the pillars, walls, doors, windows, railings, eaves, cornices, *chaitya* windows, gates etc., reveals unmistakably the methods and techniques of wooden construction. The railings consisted of uprights and cross-bars and the doors of double leaves standing on tenons. The windows were of various shapes, forms and sizes, and with vertical or diagonal bars crossing one another (*śalākā vātāpana*). Façade decorations included horse-shoe windows, and roofs had pinnacles of various shapes and forms. The walls were made of wooden planks placed vertically or horizontally (figs. 60, 66). In certain cases they were perhaps constructed of brick as well, as in figure 62 (top portion). The method of laying the bricks followed the usual manner, that is, they were laid evenly and horizontally which is illustrated in such figures as no. 33, 62, 63, 64, 66, 67, 70, for example. This method of brick construction is current even today.

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Chapter Eight

RITUALS

I

In all primitive societies one finds in observance certain rites and rituals connected with the laying of foundation of and first entrance to dwelling houses. Such rites and rituals seem to have been later adopted and integrated by civilised and sophisticated societies. In India at any rate, we find that such rituals had been in vogue already from the time represented by the *Ṛig-Veda* and the *Atharva-Veda*. Gradually they became a part and parcel of Brahmanical rituals as exemplified by the *Gṛihya-sūtras* and practised even today not only in villages but in towns as well and by relatively more educated and sophisticated social groups. Presumably these rituals which are many and various in different parts of this vast country, were adopted from relatively primitive societies and was eventually integrated into the Brahmanical socio-religious pattern, with later additions and accretions.

An analysis of the rituals of primitive social groups reveal that originally such practices were intended to propitiate the evil spirits that were supposed to haunt a *vāstu* or a site selected for the building of dwelling houses for human beings. They were also intended for invocations of spirits that were supposed to protect the buildings and their inmates from natural calamities, disease and death. Some of the rites were of magical significance and not unoften connected with fertility cults. This will be evident as we proceed to describe a few of the rites.

Gradually such rites and rituals came to be clothed in Brahmanical ideology and practies, with prayers and incantations invoking the gods for peace, protection, prosperity and happiness of the house itself and its inmates. But through all these the primitive attitude of propitiating a *vāstupati* and other evil spirits who were supposed to lord over a chosen site, never fail to peep through.

In this chapter an attempt is being made to describe, in brief, some of the rites and rituals connected with the building of and entrance to a new house (*gṛihapratishṭhā* and *gṛihapraveśa*) to enable us have an idea of the socio-religious background against which early Indian building and settlement-planning activities have to be studied and understood. With this end in view it is proposed to describe the rituals that we find in observance amongst some of the primitive tribes of India. These descriptions are only illustrative; no attempt is being made to be exhaustive so far as the tribes are concerned. This would be followed by a reference to those rituals that are found alluded to in earliest Sanskrit texts like the *Vedas* and the *Brāhmaṇas* and later, in other Sanskrit hieratic and literary texts. Finally some reference will be made to practices that are found current today amongst Brahmanical Hindus. Incidentally, this chapter seeks to illustrate the continuity of house-building rituals in India from very early times to the present day, just as a couple of earlier chapters would reveal the continuity of housetypes and forms from primitive and early historical ages to our own days. It should be mentioned that no reference is being made to rites and rituals that were observed in connection with the foundation and consecration of religious edifices which, however, follow more or less the same principles.

The Todas represent one of the earliest primitive tribes of India—a unique tribe of pastoral semi-nomads living in the Nilgiri hills. Generally, a Toda intending to build a *mand* or *mad* (hamlet), will select two or three sites and seek the advice of the priest about the best site. Once the site is selected, he will go to their shrine early in the morning and offer *pūjā* to their deities, the chief of whom is *dharmar* (cf. *dharma pūjā* current among the Santals of West Bengal). The offerings consist of buffalo milk, honey and cooked rice served on small *tedu* leaves. The *pūjās* start before sunrise and take about 4 to 5 hours. The priest offers prayers and selects an auspicious day. On the specific day, before sunrise, they go to the selected site where a boy of about 15 or 16 buries three pieces of wood, each measuring about two inches, from a *pal* tree, at the centre of the proposed site. He also buries coins and nails, both at the front and rear limits of the proposed hut which is to face the east. Offers are then made again to *dharmar*. This is followed by a community feast and community singing and dancing.

When finished, the hut is occupied after usual ceremonies. An auspicious day is chosen; early in the morning they go to the newly built *mand* with offerings of rice, milk, honey, flower etc., and *pūjā* is offered to *dharmar*. Women enter the house first followed by men. Food is then ccooked in the hut and a feast follows, in which members of the community take part. This is followed by community singing and dancing.[1]

The Nagas are one of the most primitive tribes of India, least affected by civilisation. Naga villages are fenced for defence and every house-owner has his separate dwelling. The building of a new house of a villager is attended by certain ceremonies which are elaborate in the case of the chief of the clan and simple in that of an ordinary villager.

The Angami Naga places two flat stones on the sites selected for the building. If a lucky dream favours him during the night that follows, he with his wife goes to the site next evening taking fire, fuel, fowl and food along with them. There they take their food. This has to be followed by another lucky dream the following night; otherwise the site would be rejected. When the building of the house is completed fire is brought from the *kika-kep-fuma*[2] of one who has performed the *lesu-genna*[3] and who has horns on the roof of his house. But if there is no *kika-kep-fuma*, fire can be brought from a house where no death had taken place.

More elaborate rituals are observed in certain other villages. At the site selected for the purpose of building a house the master makes a hearth, by the side of which he places two pieces of thatching grass and little rice-beer. The *kemove*[4] and the *kika-kep-fuma* must also be placed on the site. It is obligatory on all those present in the ceremony, to help the master in building the house. The middle post is fixed and when the house frame is ready the master dressed in ceremonial clothes, enter the house carrying a fire and a spear. Three days later thatch is placed on the roof, and five days are observed as *genna* by the owner and his wife. During this period, they take only rice beer and offer the same to the visitors and the guests.[5]

The Sema Nagas,[6] at the time of erecting a new house or of remodelling of an old one, observe certain rites, the extent of which depends on whether it is a house of the chief or that of an ordinary villagers. In the latter case, the builder must observe the *genna* at least three days during which period he cannot speak to anybody, nor is he allowed to feed any person. But if the house is to belong to the chief he has to observe some ceremonial rites at the time of the foundation of the site and the erection of the front post. A hole is dug to take the front post; a chicken is then killed in the hole and the front post is put upon the body of the chicken. The same day the owner again kills a fat cock, preferably of red colour, by hitting it on the post and uttering the following verse—"May you (the post) have a long life; let dogs increase; let pigs multiply, let riches increase; let illness and death be forbidden."

The thatching of the roof of the Sema chief's house also seems to have a ritualistic significance. The first sheaf of straw on the front side of the roof is placed by the leading warrior of the village. He is followed by a second and a third warrior. The three warriors then share a pig which had been killed the-day-before.

When an Ao Naga wants to build a new house, he first selects a site and then finds out from a medicine-man if the site would prove to be a lucky one for him. The medicine-man visits the site and then gives his answer after contacting the spirits living there. If the answer is favourable for the owner the medicine-man names an old man whose customary offerings would be acceptable to the said spirits. The old man then performs the ceremony by offering six leaves of rice and six leaves of meat and ginger and six cups of rice-beer. After this he takes a fowl and plucks it alive and says, "Let this house site be fortunate. Let there be no sickness or illness. Let there be no head-ache or stomach-ache. Let fine boys and girls be born." He then cuts the fowl by a sharp piece of bamboo and from the entrails he predicts the general fortune of the master and his wife and also of their children. After the ceremony is over the site is left vacant for three days and if within this period all the food kept there are not eaten up by a village pig or jungle cat or any other animal, the site should be considered inauspicions and must be rejected.

Materials for building are generally collected some days before the actual ceremony takes place. They believe that unless bamboos and thatching grass are cut during the dark period of the dark moon or immediately after full moon, insects might attack them. The builders then start their work. In the beginning the lines of the walls are marked out and the posts are put up. According to *Chongli* custom an egg is cracked against the pillar which is erected first and the following words are uttered—"If fire catches this house, may it become water. Let there be no illness and sickness here." After that he eats the contents of the egg and ties the shell on the post.

The Garos celebrate the building of a new house by a sacrifice, which is followed by a house-warming feast. A number of house dedication songs are current among them; these songs are sung on such occasions. The guests assembled sit in two rows in the main room of the new house and each one of them in turn gets up and dances between the rows as he sings the song. At intervals the other guests join in with a chorus which seems to consist mainly of the repetition of the sound 'ka' or 'kai', which means to tie or bind. It is evident that the refrain of the song is but a magical exhortation to the spirits to tie or bind firmly the component parts of the house.[8]

When the Santals, who live collectively, want to select a new site for the laying out of a village, three or four men with a leader (whom they called *ojhā*) proceed to the forest. If they see a quail flying over the site tentatively chosen, the site will be rejected outright. They believe that the villlage raised on that site would one day be deserted. But if they see any other bird sitting on its eggs at the site, or a tiger, or the foot marks of the latter, they consider it a lucky site and proceed to raise the village there. But before they do so, the *ojhā* examines the site further by first isolating the site by five vermilion marks. Close to these marks he puts some sun-dried rice and an earthen pot full of water. At a little distance a couple or two of white fowls are tied up in a row. Next morning they return to investigate the scene; if they find the fowls to have shed no feather and the water in the earthen pot undiminished, then the site is considered to be auspicious without doubt. But if it is otherwise, the site would be regarded as ill-fated.

After the selection of the site they dig a hole and fill it up with the earth dug out, to test the stability and fertility of the soil. If the hole to be filled up, takes the exact amount of earth dug out, then the site is believed to be auspicious and capable of yielding abundant crop. Otherwise it will be rejected as inauspicious.

So far as the individual building is concerned, a low closet is built in one corner of the house to provide a separate dwelling place for the ancestors. In the closet rice and beer are offered regularly to the ancestors and to the house *boṅgā*. No woman of the family, not even the married daughter is permitted to enter it.[9]

When the Oraon wishes to build a new house, he goes one evening to the intended spot and throws a few grains of rice on the ground. Next morning he comes back for investigation and if he finds that the grains have disappeared, the site would be considered as an undesirable one, though not extremely bad. If the rice remains intact, the site will be finally chosen as an auspicious one and the ground would be marked around the rice-grains before the building work is taken up. At the time of entering a new house the Oraon gives a feast to the fellow tribesmen of the village.[10]

II

The brief description given above of tribal house-building rites would serve, it is believed, as a proper background of cognate and similar rites recognised by organised Brahmanism and Buddhism and recorded in texts beginning from the *Vedas* right through to the *Purāṇas*, *Āgamas* and *Śilpa-śāstras*.

The *Ṛig-Veda* contains frequent mention of *Vāstupati* or lord of the *Vāstu*,[11] i.e., dwelling house. In several hymns, the celebration of the *Vāstoshpati* is referred to, and the indication is that a firm post which is the symbol of the *Vāstoshpati* is the centre of the celebration.[12] The spirit of the *Vāstoshpati* is invoked and the firm post is supposed to keep off calamity. The *Atharva-Veda* too has a series of hymns pertaining to *Vāstoshpati*, entitled *Vāstoshpatyāni*.[13] A particular hymn is recited while the central post is being fixed. A stanza in the hymn referred to, mentions the placing of the cross-beam upon the post when the following prayer is recited: "Do thou oh Cross-beam, ascend the post according to regulation; do thou mighty ruling, hold off the enemies. May they that approach thee reverently, oh House, not suffer injury; may all our heroes live a hundred autumn."[14] Here in this chapter, almost all the hymns are prayers for the happiness, prosperity and abundance of the dwellers. Thus in one hymn addressed to the *Vāstoshpati*, we read:—"a supporter art thou, oh House, with broad roof containing purified grain. To thee may the calf come, to thee the child, to thee the milch cow . . . oh Mistress of dwelling, clothed in grass, be thou kindly disposed, give us moreover wealth along with heroes . . . hither to this house hath come the tender child, hither the calf along with the other domestic animals, hither the vessel full of liquor, together with bowls of sour milk."[15] When the house is ready for occupation, the master and his wife enter the house with a pitcher full of water and with the immortal fire.

Reference to this old Vedic deity, *Vāstoshpati*,[16] is also made by Pāṇini as the presiding deity of *Vāstu* or homestead. In one of the *Jātaka* stories, a prince is described as performing the consecration ceremony (*pāsāda maṅgalam*) of a new palace.[17] In another story the ceremony of entering a new house is described as *geha-pavessana*.[18] But unfortunately no description of the ceremony is given.

In the *Rāmāyaṇa* Rāmachandra is said to have performed *Vāstu-paśmana* ceremony and the animal sacrifice (*vaiśva-deva-vali*) connected with it, when he built even a temporary structure in the shape of a small cottage on the Chitrakūṭa hill.[19] In the *Mahābhārata* too we are told that sacrificial rites were performed at the time of the construction of a new house; these rites were called *śānti* or *maṅgala*.[20]

In all these evidences just cited, it will be noticed that there are significant parallels with cognate rites practised by primitive tribes in India, for example, animal sacrifice connected with the fixing of the firm post, bringing fire into the house, incantations of prayer for prosperity and happiness to the *Vāstu* spirits, etc. are all similar in form and meaning.

The most elaborate references to house-building rites and rituals are however found in the *Gṛihya-sūtras* which may be said to constitute a full picture of Brahmanical practices in this respect, practices that have come down to this day. Various ceremonies regarding the site and the construction and entering of a new house are given in the different sections of these *sūtras*. In the *Sāṅkhyāyana Gṛihyasūtra*, for example, one finds that when a man wishes to have a house built, he draws with the branch of an *udumbara* tree three times a line round the selected spot, with the following incantations: "Here I include the dwelling for the sake of food . . . this branch of the immortal one (the *udumbara* tree is a recognised fertility symbol) I erect, a stream of honey, promoting wealth. The child, the young one, cries to it; the cow shall flock to it, the increasingly fertile one."[21] He then puts an *udumbara* branch besmeared with *ghee*, into the pit which has been dug for the right post. The same verse is repeated for the erection of the left door post. The prayer is not only for wealth and happiness, but also for protection from calamities and destruction, which is as follows: 'May the malevolent ones not reach thee'.[22] In another verse[23] the master of the house in introducing and placing the fire in the hearth recites: 'Do no harm to us, to the old nor to the young; be a savior to us, to men and animals'. The posts in the different directions are supposed to signify different meanings: "The two posts to the east, truth and faith; those to the south, sacrifice and gift; those to the west, strength and power; those to the north, the brāhmaṇa and kshatra." The pinnacle of the house is named as Fortune while the firm post is called the Law.[25]

When the sacrifice is over, the master of the house establishes the sacred fire and recites *mantras* which are but prayers to the *Vāstoshpati* for protection of the members of his family from sorrow and calamity and for peace and prosperity. The master then enters the house taking with him his wife and eldest son carrying grains, uttering at the same time a prayer to the following effect: "Indra's house is blessed, wealthy, protecting, that I enter with my wife and with offsprings, with cattles, with increase of wealth, with everything that is mine."[26] "I enter the blesseth, the joyful house which does not bring death to men and which is also rich in men. Bringing refreshment dropping ghee, I shall joyfully rest."[27]

There are similar descriptions of rituals in other *Gṛihyasūtra* texts as well, sometimes in greater elaboration, as for example, in the *Āśvalāyana Gṛihya sūtra.*[28] But since the principle is the same, it may suffice to summarise the rituals as detailed in the *Āśvalāyana* and omit the rest.

The *Āśvalāyana Gṛihyasūtra* speaks elaborately of the selection of the site and examination of the ground. The text recommends that the land which is not barren or disputed and contains herbs (*oshadhi*), large trees (*vanaspati*) and *kuśa* and *viriṇa* grass, should be selected for the construction of the dwelling house. Thorny and juicy trees and bushes of *apamārga*, *tilvaka*, *parivyādha* etc., should be thoroughly uprooted and thrown away. The selected site should be high on all sides, slightly low in the middle and sloping towards the east. The different buildings should be constructed in the middle of the site with the bed-room in the east, the kitchen a little further to the east or south-east of the bedroom, and the drain along the northern side. According to some, the *sabhā-gṛiha* should be built in the north, but preferably, according to Āśvalāyana, in the middle of the site.

The treatise recommends further that a knee-deep hole should be dug in the site and the hole should be filled in with the earth dug out from it. The site will be considered good or auspicious if a quantity of the earth remains surplus after filling the hole, and bad, if the quantity of the earth fails to fill up the hole. Then at dusk, the hole, after removing the earth, should be filled with water. If in the next morning the hole still contains some quantity of water, the site will be considered good; if the hole is just soaked with water, the site is mediocre, and if dry altogether, it will be considered bad.

The selected site should be thoroughly ploughed and a square or rectangular plot, east-westwise long, should be measured out. Then after reciting the *Śāntanīya hymn*,[29] the householder should go thrice round the site and sprinkle water on it, first with the branch of the *śamī* or *udumbara* tree and then with continuous flow of water after reciting the group of the three *Ṛiks* beginning with "*āpohiṣṭha mayobhuvaḥ*".[30] Less important rooms like inner apartments should be built on the space between two beams (*vaṁsa*) and separated from each other by walls. *Avakā* and *sīpāla* should be put inside the holes that are intended to take the posts of the house; they are supposed to protect the house from fire. The middle-post should then be sprinkled with water mixed with *vṛīhi* or *yava* with the *mantra:* "*Achyutāya bhaumāya svāhā*". Simultaneously the following *mantra* should also be uttered: "May our riches not be squandered; *Vāstoshpati*, a firm post thou, drive away calamity."[31] Then the middle-most post should be placed in the hole along with the *mantras*: "*Thaiva tishṭha tilvilas*" etc., and "*Ā tvā prāpannaghāyavaḥ*" etc. The beam should be placed on the middle-most post with the *mantra*: "*Etena sthūnam adhiroha vaṁśa*" etc. *Durvā* grass should then be placed on four slabs of stone and then a *maṇikā* (water jar) should be placed on it along with the *mantra*: "*Prithivyādhi sambhava*" or with *Araṅgaro vāvadīti* etc. Then water should be sprinkled on it with the *mantra*: "*Etu Rājā Varuṇo*" etc. Then the ceremony of *Vāstu-śānti* should be performed thus:

A piece of gold should be put in water mixed with *vṛīhi* and *yava* and then water should be sprinkled after going thrice around the *vāstu* along with the recitation of the *Śāntanīya hymn*. Next an incessent flow of water should be maintained along with the mantra "*Āpohiṣṭha mayobhuvaḥ*". *Sthalikaka* should then be cooked in the house; four oblations should be offered with the four *Riks* beginning with "*vāstoshpate pṛitijanihyasman*"[32] etc., and then Brahmins should be fed and they should utter "*śivam vāstu, śivam* *vāstu*". Then the householder enters the newly built house with his eldest son and wife carrying grains, and utter the same *mantras* as referred to above in the *Sāṅkhyāyana Gṛihyasūtra*.

More or less similar practices and rites are detailed in the *Pāraskara* and *Gobhila Gṛihyasūtras*.[33]

It is insteresting to note that the *Saṁhitās*, as for example, the *Vājasaneyī* and the *Taittirīya*,[34] refer to invocations or prayers to the earth begging her to stand firm for the well-being of the householder. The *Bṛihatsaṁhitā*[35] recommends the same practice of pouring water into the hole dug into the soil. According to this later text the soil is to be examined also by putting fire into the pit. The fire may burn or go out; if it burns then the soil is good; if not, the site should be abandoned.

Reference to elaborate house-building rituals are also made in the *Purāṇas*, but the most detailed description is found in the *Matsya Purāṇa*,[36] which may briefly be summarised. It recommends the laying of the foundation of a house on an auspicious day, which should not be in the month of Chaitra or Jyaishṭha or Bhādra or Āśvin or Pausha, and not on Sundays and Tuesdays. The months of Vaiśākha, Āṣāḍha, Śrāvana, Kārtika, Agrahāyaṇa, Māgha and Phālguṇa are considered to be good. The examination of the soil and selection of the site should precede the foundation of the house. It also recommends the examination of the soil by digging a hole and filling it with earth as described in the *Gṛihyasūtras*. Another mode of examination of the land is by getting the land ploughed and by sowing some seeds on the ploughed ground. The ground is considered good if the seeds sprout and become big within seven days; but if they are not sufficiently big the site should be abandoned. The *Matsya Purāṇa* also recommends certain tests for classification of the soil according to castes, which means some sites are good for *Brāhmaṇas*, some for *Kshatriyas* and certain others for *Vaiśyas* and still certain others for the *Śūdras*.

When all the testings are over the ground is to be washed by *pañcha gavya* (cowdung and urine, honey, milk, curd and *pāyasa* or rice pudding) and sprinkled with medicinal water. If the owner feels an itching sensation while the foundation is being laid it would mean that there must be some foreign matter under the ground, which should at once be removed. The *Matsya Purāṇa*[37] prescribes that there should be no construction of a dwelling house near a temple or close to the house of a wicked man or to that of a minister. The house should not be very near the crossing of the four ways, which is supposed to bring misery and unhappiness to the dwellers. The same text refers to a number of ominous signs which should be taken care of by the householder in choosing a site and laying the foundation of the building.

Reference to similar rites and rituals are also to be found, and this in a more elaborate manner, in such texts as the *Mānasāra*,[38] the *Samarāṅgaṇa sūtradhara*,[39] the *Mayamata*[40] and the *Yuktikalpataru*.[41] They follow in the main the principles laid down in the *Gṛihyasūtras*. For our purpose, therefore, it is no more necessary to refer to them.

III

But a passing reference should be made to current Brahmanical practices in house-building rites as well as to certain popular rites and rituals gone through by villagers even today in Bengal, for example, to enable us find out the extent of the continuity of the primitive tradition as well as of the hieratic one as referred to in the Brahmanical texts.

It is not in the least curious that current Brahmanical practices follow in the main not only the principle but also the rites detailed in the *Gṛihyasūtras* and the *Purāṇas*, the only difference being that changed conditions of today have necessitated certain changes in the actual ceremonies. But such changes are not of any real significance. Since the availability of land suitable for dwelling purposes is restricted by conditions over which modern man has little control, the rites connected with the selection or choice of land are observed but little. But a systematic process as laid down in earlier texts is followed right from the beginning of the laying of the foundation up to the entering of the newly built house. In certain parts of India, however, people attach a great deal of importance to the month which is chosen for starting the construction of a house. In this respect people usually follow the *Purāṇic* prescription as given in the *Matsya Purāṇa* referred to above, but in certain parts of the country the three months beginning from Bhādra, are considered particularly auspicious, since the *Nāga Vāsukī* who holds the earth on its heads, is supposed to lie asleep on the left side during these three months, placing his head towards the east.[42] Before the actual construction begins a small hole is dug in some place of the intended site; the hole is then filled in with cow-dung and then all the gods including the *Vāstoshpati* are worshipped. The priest then prays to the goddess Earth asking for good fortune and sons and prosperity for the householder. He also prays on behalf of the master of the house, for offering him a space under the sun and for success in his efforts.[43] The priest along with householder then goes round the hole and fixes four posts around it; an unbroken brick is then placed inside the hole by way of laying the foundation; the brick is then covered over with *durvā* grass, curd, flower, betel-leaf and clods of earth. As the foundation is being laid the priest utters the following *mantras* "*Yathā-chalo girir Meru Himavānścha yathā chaloḥ* | *subhāya bho gṛihastambha tathā tvamachalobhava* ||"[44] (Just as the mount Meru and the Himavat are steadfast and immovable, so, oh, the House-post, you too be auspicious and immovable.)

In the villages of Bengal the common village folk follow more or less the same practices, especially in connection with the laying of the foundation. But it will be seen from the description that follows that, in respect of the *gṛihapraveśa* rites, there are certain elements which are not included in the hieratic texts or in the Brahmanical calenders.

Before entering the house the master offers worship to and seeks blessings of his forefathers as well as permission from them to enter the house. Sacrifices are offered to the spirits who are requested to free the site from their evil influences. For this purpose the main articles that constitute the sacrifical offering, are turmeric or *haridrā*, mustard seeds or *sarishā* and ginger or *ādraka*. Rice-pudding is then placed in a small hole dug for the purpose in the front yard of the house, which presumably constitute the offering to the *Vāstu*.[45] An earthen lamp is then placed inside the hole, which is supposed to burn for the whole day. Worship is then offered to the various deities, after which the master with his wife and the eldest son enters the house by holding the tail of a cow. At the door-front of the house is placed a pitcher full of water and holding mango leaves. The wife of the master carries a pitcher full of water on the left arm and a winnowing basket on her head, on which is placed paddy, milk, curd, honey, a lamp, five kinds of seeds and two pieces of gold and silver. It is obvious that all these objects are symbols of plenty and prosperity and purport to be the distant memories of practices connected with sympathetic magic. In certain parts of Bengal, the lady of the house also carries a fish-basket in her right hand. Some people also circumbulate the house three or seven times before entering it. Immediately after the house is entered into, the master or a priest in his behalf, offers worship to the *Vāstoshpati* for the prosperity and well-being of all the dwellers.

Even a casual scrutiny of house-building rites and rituals as given above, will show that the more fundamental rites and rituals are common to tribal, Brahmanical sacredotal and hieratic, and Brahmanical current and folk practices in the villages. In all these, carrying and establishment of fire to and at the site and inside of the building, offering the sacrifices to the spirits and the lord of the *Vāstu*, the firm post symbolising the *Vāstoshpati*, the hole and filling it in with earth or slabs of stone or brick, entering the house with wife and eldest son and what is more important, articulated prayer for wealth, prosperity, happiness and security, are common to all levels and stages of society. One may not, therefore, find any real difficulty to assume that similar rites and rituals were observed in the selection of sites, laying of the foundation and entering the house during the period which this dissertation deals with. The phrases "*pāsādamaṅgalam*" and *geha-pavessana* mentioned in the Pāli texts, may, therefore, be understood better in this context.

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APPENDIX

RECENT ARCHAEOLOGICAL EVIDENCE

I

BETWEEN June, 1956 when this dissertation was made ready for submission and August, 1963 when it went to press for publication, Indian Archaeology, especially proto-historic archaeology, had taken long strides and made significant contributions to our knowledge of town-planning and secular architecture of proto-historic and historical India. The proto-historic fields, strictly speaking, is outside the scope of this dissertation; yet one feels that a knowledge of the proto-historic background may not altogether be irrelevant for a better appreciation of our subject. It is, therefore, proposed that we take a stock of and incorporate the additional knowledge and information that the archaelogist's spade has made available to us in the meanwhile, not only in respect of the historical period covered by this dissertation but of the proto-historic as well.

Even before Pakistan was carved out as an independent sovereign state archaeologists were busy attempting to know more and more of the nature and character of not only the civilisation of the Indus valley itself, but also in tracing the extension of that civilisation towards the east, south and south-east of the Indian peninsula. The attempt in the latter direction seems to have received a fresh and direct impetus after the achievement of independence in 1947. Since then the Archaeological Survey of India aided in certain cases by Indian universities, has been busy in locating and excavating proto-historic sites, more or less cognates of the chalcolithic sites of the Indus valley, in Punjab, Rajputana, Gujrat and the Malwa region of what is now called Madhya Pradesh as well as in the south. Similar attempts were also being made by the Pakistan Archaeological Survey in Sind and Baluchistan. This extensive field work has brought to light a wealth of material evidence on town-planning and house-building activities in the Indian sub-continent during the long proto-historic centuries. The major sites that should be taken into account in this connection are Kot Diji in Sind and the Quetta valley in Baluchistan; Rupar in Panjab; Ahar, Gilund and Kalibangan in Rajasthan; Rangpur and Lothal in Gujrat; Nevasa in the Godavari valley; Navdatoli, Mahesvar and Nagda in the Malwa region, and Maski and Brahmagiri in the south. But before these sites are taken up one by one, one must take into account the results of further excavations at and study of the twin sites of Harappa and Mohenjodaro.

Situated three hundred fifty miles apart Mohenjodaro and Harappa are comparable cities on more points than one. Resemblances are unique, indeed. Both are upwards three miles in circuit; both have a citadel of the shape of a parallelogram raised on an artificial platform, on a higher level than that of the city itself. Both citadels are provided with strong defensive walls, and both are built on another occupational stratum which from its remains seems to have been of the nature and pattern of a village, and as such both represent a complete break from an earlier tradition. In both cases there is a mass of evidence to prove that they were planned systematically and on the same principles and same methods and techniques, with fairly wide, parallel streets running straight and cutting at right angles, dividing the city in large rectangular blocks, and with underground drainage made of corbelled arches, for instance. In both, the houses situated in the blocks just referred to, are built of burnt brick and are provided with more than one floor and systematic drainage, bath rooms, rubbish shoots etc. and approached by narrow alleys; both cities are characterised by large public baths, huge granaries and rows of workmen's quarters with platforms for grinding corn. The resemblance between the two cities is indeed so close as to "make it look very much as if they were the twin capitals of a single government."[1] There can be no doubt that both the cities appear suddenly on the scene of history, already well formed, sophisticated and even conventional and stereotyped. Both cities must have passed through many centuries of time but they hardly reveal any process of evolution either in planning or in building technique, or in their arts and crafts. Equally doubtless is the fact that both cities were raised, lived in and sustained by an affluent and well-organised commerical community.

Every large rectangular block referred to above consisted of a number of rectangular houses, some of them fairly large, all built of burnt brick joined presumably by mud mortar and provided with more than one floor, the upper being reached by a flight of stairs. The kitchen provided with ovens as well as the family bath, were on the ground floor. The raised platform of the citadel and the massive defence walls were however built of mud and mud brick. This wall wide at the base and tapering upwards, had an external revetment of baked brick. Along the wall were regular salients or bastions at fairly frequent intervals. "On the western side a carved re-entrant in the defences, controlled by a bastion, led to a system of extra-mural ramps and terraces aproached by gates and supervised from guard rooms. At the southern end of this system there seems to have been a ramp or stair leading up to the citadel".[2]

The buildings within the Harappa citadel or acropolis have been ruined beyond recognition, but what remains of those within the Mohenjodaro citadel seems to suggest "not so much of a dwelling place or a temple as the setting for some sort of elaborate ritual which might be either royal or religious".[3] In the Harappa city itself there are three groups of structures: (*a*) a double range of barrack-like dwelling evidently for the use of workmen; (*b*) a series of five rows of circular working platforms, evidently for grinding corn; and (*c*) a double range of granaries on a revetted platform. The granaries, each roughly 50 × 10 feet, are ranged symmetrically in two rows of six, with a wide (23 feet) passage in-between on a podium of rammed mud, providing access to the granaries by short flights of brick steps. The floors of the granaries rested on sleeper walls, three to each unit, the central one having rectangular thickening intended presumably to carry posts or piers for additional roof-support.[4] Similar forms and building technique of granaries are known from those of the Tigris-Euphrates valley and later, of the Roman forts, and it is not unlikely that the Indus valley city-planning and house-building represent a tradition current throughout the Mediterranean east, that is, the region from Rome eastwards along the north Mediterranean coastline through western Asia right upto the Indus valley.

The excavations at Kot Diji in Sind seem to offer some clue as to how the already well-developed Indus valley city-culture came to overlay earlier cultures of the area, and this all on a sudden as it were. Here we have as many as ten or eleven occupational levels, all presumably neolithic and indigenous in pattern and character, overlaid by a layer of burnt material, which in its turn is overlaid by another layer that is typically Harappan. This evidence perhaps indicates that there was violent destruction by burning of a local settlement before the Harappa people came into the Indus valley with their already well-formed culture. The excavators believe that this destruction may have been effected by the Harappans themselves. What was the nature of planning of these local pre-Harappan settlements or as a matter of that, of the character of their houses, we have not the slightest evidence to form an idea from.

Excavations in the Quetta valley in Baluchistan have laid bare at the lowest stratum, the remains of a primitive pastoral society. At the next habitational phase characterised by the use of copper and fine wheel-made pottery, we find however, remains of villages of fairly large size, with houses of varied but small sizes, provided with sunken hearths and doors moved on stone sockets. Walls were made of mud but they stood on a foundation of flat stones and stone-pebbles. The passages between the houses were narrow and irregular. In the next or third phase the remains are typically Harappan, which means presumably that the Harappan overlaid the second phase characterised by Irani-Baluch traits.[5]

Excavations at Rupar where the Sutlej enters into the fertile plains of the Panjab, have been rather limited in range and extent. As many as six cultural periods have been laid bare here, of which the two earliest ones are pre-historic. Four phases of Harappan buildings are encountered the earliest being the one in which river pebbles, roughly hewn *kankar* stones, mud and baked brick and mud mortar were extensively used for building purposes.[6]

Further east, at Alamgirpur in Uttar Pradesh, we have evidence of expansion of Harappan culture in the Gaṅgā-Yamunā valley. But no building phases where brought to light here, though from the remains of kiln-burnt brick of atleast two different sizes, fairly large, we may postulate that houses here were generally brick-built.[7]

But the proto-historic sites of Rajasthan—Ahar, Gilund and Kalibangan, for instance,—provide richer material. At Ahar near Udaipur Railway Station, remains of houses have been found at various levels, and materials used are mud, mud-brick and local, easily dressed schist stone. They seem to have been roofed with earth laid on wattle and bamboo. But from the nature of the evidence one cannot be sure if stone and mud-brick were used simultaneously or one preceded the use of another. The walls of mud seem to have been supported by and laid on bamboo screens or bamboo halves, impressions of which have been found in the *debris* of the walls along with marks of post-holes on the floor. Small chips and nodules of weathered rock mixed with clay, were also made use of in building the walls. The floors of the houses were of thick black clay mixed with sticky yellowish silt. The sizes of the houses seem to have been fairly large (one 30′×15′, another 45′ long), and were probably partitioned by walls of mud and mud-brick. Many of the features of house building of pre-historic Ahar are still practised as they must been through the centuries and millenniums by the local people, without practically any change.[8]

Houses built of mud and mud-brick and roofed with a mixture of reddish clay, or mud mixed with reeds and split bamboos, have also been unearthed at Gilund situated forty-five miles north-east of Udaipur. Some of these houses were provided with white-washed earthen ovens. In a mud-brick house of the second structural phase burnt-brick bats seem to have been used; this house has a clay-lined pit which presumably served as an oven. Here we have also another structure of large size and proportion (100×80 ft.) with four parallel walls running north-south and joined at the southern end by an east-west wall, the walls (13′×3′4″) being made of burnt-brick laid alternately as headers and stretchers and cemented with mud. But what this huge structure was used for, is difficult to guess. Equally enigmatic is another structure, a kiln-burnt brick wall laid over a stone rubble foundation, the wall being plastered with a mixture of clay lime and sand.[9] Insofar as building materials and techniques are concerned Ahar and Gilgund belong to the same culture-complex, but the Gilund structures are larger and more elaborate, indicating perhaps a higher civic and economic level.

Kalibangan, a village in northern Rajasthan, situated on the southern bank of the Ghaggar (ancient Sarasvatī) river, has yielded the remains of what may be called a typical Harappan city. The site has two mounds. The smaller of the two is the western one which has revealed a massive platform made of mud-brick, on which "towered the relevant buildings, possibly within a mud-brick curtain wall. All this recalls the mud-brick citadel mounds which help to give a metropolitan aspect to Harappa and Mohenjodaro; and if, as has been surmised, Harappa and Mojenjodaro with their citadel mounds represent two provincial capitals of a big empire, it is not unlikely that Kalibangan was a third one, commanding the Sarasvati valley".[10] But since it is smaller than the acropolis or citadel of Harrapa or Mohenjodaro, and since it overlooks the Ghaggar, Sankalia believes, the platform may just be the remains of a rampart, and he seems to find support of his assumption in the materials used in its building and flooring: mud-bricks often plastered with a coating of mud for the platform and terracotta nodules and large pieces of charcoal mixed with rammed clay for flooring.[11] The larger mound which is on the east, has yielded successive remains of ordinary houses starting right on the natural soil. The houses were oriented roughtly along the cardinal directions and built generally of mud-brick but with occasional use of kiln-burnt brick, all arranged in regular courses of headers and stretchers. The walls were usually plastered with mud, and the floors were made of rammed clay mixed with terracotta nodules and pieces of charcoal, a method which survives in this area to this day. Occasionally a part of the floor was just paved with burnt bricks or with fragments of flat triangular terracotta pieces. We do not have any evidence to indicate how the roofs were made, but the presence of wooden rafters embedded in clay seems to suggest a mud-roof supported by such rafters, which is indeed the method of roofing that survives in the reign to this day. Every single house seems to have comprised a courtyard and few large and small rectangular rooms; within each house there were small oblong enclosures made of mud-brick which were found to contain broken fragments of pottery, and ovoid pits full of charcoal and one or more bricks in the middle. What these oblong enclosures and ovoid pits were intended for, is difficult to say.[12]

There is enough evidence to show that the system of town-planning followed at Kalibangan, with its roughly parallel streets and lanes running north-south and east-west and cutting at right angles, and dividing the town into rectangular blocks, was difinitely Harappan. The drainage system was also of the same pattern. One of the interesting points revealed at Kalibangan is that the soil of the place was and still is charged with saltpetre, and since this soil went into the making of the bricks, they "were used, more often than not, without firing".[13]

Echoes of Harappan town-planning and house-building, in a somewhat provincial accent and intonation, are heard as far south-east as Rangpur and Lothal in Gujrat, for instance. At Rangpur the alignment of roads, drainage system, houses made of mud-brick, brick fort or rampart, all testify to the existence of a late-Harappan town at the site.[14] But much more elaborate and significant are the remains of a city of the same phase at Lothal (the mound of the dead) situated at the confluence of the rivers, the Bhogava and the Sabarmati. Roughly two miles in circumference, here was indeed a miniature Mohenjodaro, well-planned and well laid out, with a rampart encircling the acropolis or citadel, and in the lower town, a cemetery in the north-west outside of the rampart, and on the east a large brick-built enclosure which has been tentatively identified as a dockyard. Four main streets, two running north-south and two east-west, with two side lanes, so far revealed, divided the city into six blocks, each built on large mud-brick platforms of varying height. A row of as may as twelve large houses (72′× 42′, on average) were found to be standing on one side of a street, while on both sides of another street were found smaller houses with two or three small rooms of varying sizes, presumed to have been used as shops. Some of the houses were provided with front verandahs and a central courtyard with rooms around. The houses of craftsmen were small and made of mud-brick alone. Internal and public drainage system at Lothal was indeed of a high order, the former being connected with the latter on the road. Bathrooms were paved with bitumen and lavatories provided with a soak-pit at the back. There was atleast one establishment which may have been a public building, which reveals a very elaborate internal drainage system. In the earliest phase the alignment of houses and the general planning were regular, but degeneration seems to have set in later as evidenced by irregular alignments and drains haphazardly laid.

The so-called dockyard is roughly trapezoidal in plan, from north to south, and measures 710′× 120′ from east to west. A large opening (23′ wide) in the eastern wall is believed to have been the 'inlet channel', while there is a similar opening on the south, assumed to have been the 'spill channel'. Personally, I should think that what has been assumed to have been a dockyard, was nothing but a big, well-constructed tank for assuring a constant supply of good drinking water to a city which must have been very thickly populated. There is enough evidence to show that the town was again and again ravaged by flood and repeated attempts were made to save it by raising the mud-brick platforms and strengthening the rampart wall. The excavations at Lothal have yielded among other things, instruments like foot-rule, compass, ivory measuring rod, terracotta plumb-boles etc. which must have been used in raising a city of the nature we have been speaking of.[15]

Nevasa, evidently to be derived from *nivāsa*, seems to have been a habitation of men from early stone age. Situated in the Godavari valley, on both sides of the Pravara river, the site has yielded to the excavator's spade interesting though limited evidence on the art of house-building in that region in the proto-historic period. Unfortunately no structural remains of the chalcolithic period have been revealed, though from the debris of ruins it appears that clay, lime, gravel, hydraulic lime mortar, and perhaps at a later stage, also kiln-burnt brick, were among the materials used for making the floors some of which were as thick as six to seven inches. But a more interesting find is a series of six post-holes, all round in shape and of varying diameters of four to two inches, and the remains of at least one round post, which are all presumed to have supported the roof above. This roof could not have been very heavy and was presumably made of hay or leaves laid on bamboo strips since the post-holes had never a depth of more than five or six inches.[16] The absence of any remains of walls either of clay or brick seems to suggest that these house were sort of hutments built of poor and easily perishable materials.

If Nevasa may be taken to be the representative of chalcolithic Godavari valley, Navdatoli and Mahesvar may similarly be taken to represent the civilisation of chalcolithic Malwa. Excavations at both these places, especially at Navdatoli, have revealed a series of structural remains which presumably were used as dwelling houses. It appears that houses, square, round or rectangular in foundation and shape, small (10′×8′) or large (20′×40′), and built very close to each other, used to be supported by thick wooden posts, with walls made of bamboo screens plastered inside and out with clay and washed with lime. Floors were made of clay mixed with cow-dung. Circular huts were only three to four feet in diameter, the largest one being only eight. Some of the square or rectangular huts were so small that they could not have been used for human habitation. Such circular, square or rectangular huts were probably used for storing hay, grain or small domestic animals. The houses seem to have been provided with small and large earthen pots of various descriptions, for eating, drinking, cooking and storing.[17]

A few pre- and proto-historic sites have been brought under the archaeologist's spade in the southern regions as well of the Indian peninsula, at Maski and Brahmagiri, for example. At Maski no definite evidence of building materials and house-plans has been brought to light. But the occurrence of post-holes and rammed earth flooring seems to suggest that the structures were all built of perishable materials like mud, wood, bamboo, etc. At the final stage brick may have been used since brick-bats have been found, though no brick structure has been traced.[18]

At Brahmagiri too no clear picture emerges of house plans or buildings. But there is evidence to show that small or large huts were raised on round wooden posts. At Peklihal, a cognate site, walls of such houses seem to have been made of bamboo-matting plastered with mud, and floors, of plastered clay mixed with cowdung and perhaps also or alternatively with lime. But nowhere is there any evidence of systematic planning or building or of any arrangement of sanitation.[19]

This is not the place to go into the over-all question of the migration of the urban civilisation of the Indus valley to the east, south and south-east of the Indo-Pakistan sub-continent. In what way, under what circumstances and in which times these migrations took place, are questions which cannot yet be answered with any amount of certainty though intelligent speculations can and are being made. We have some interesting and undisputed evidence of varying degrees of dilution and degeneration of the highly organised and sophisticated civilisation of the Indus valley as it spread itself in the Tapti and Godavari valleys or in the Malwa region, or even in lower Sind, Baluchistan, Gujrat and Rajasthan. But that was only in the nature of things, due to distance in time and space.

But what is more interesting from our point of view is that before the typical and systematic town-planning and house-building patterns and practices of the Indus valley made any intrusion, there had been in many of these areas, human habitations patterned in the form of villages with houses made of poor perishable materials like clay, earth, mud-brick, bamboo or wood and hay, leaves etc. At the earlier levels of excavations at Kot Diji in Sind or in the pastoral, pre-pottery hill-villages of the Quetta valley, for instance, there is definite evidence of pre-Harappan human settlements with no pretensions to systematised town-planning and house-building in permanent materials. There is no reason to assume that in Rajasthan or Gujrat, or in Central India, the Tapti or the Godavari valley, for instance, conditions were different. Here too there must have been peasant communities living in villages with houses of irregular alignment and built of mud, mud-brick, wood, bamboo, hay, thatch etc., and without any systematic arrangement for sanitation. This is clearly evident in the fact that even when the Indus valley pattern and practice in their diluted and degenerate form did make their intrusion at Navdatoli and Mahesvar, or at Ahar, for instance, the walls and roofs were still being made of mud, mud-bricks, bamboo strips, hay etc., roofs resting on wood or bamboo posts, and floors of clay and beatten earth, sometimes mixed with cowdung and stone chips or nodules. At Ahar, however, roofs rested directly on the mud wall and not on posts, exactly as they do there even today. Indeed, there is enough evidence to show that the Harappan traits and traditions were an imposition on earlier peasant cultures of these areas and were locally somewhat transformed and conditioned by them. Once such traits and traditions exhausted themselves, the earlier indigenous culture of peasant communities with their traditional village-planning and house-building practices reasserted itself. How it did so can be seen at Ahar and Navdatoli, for instance.

II

Having given a general survey of town-planning and house-building activities of pre- and proto-historic times, we may now proceed to summarise the results of recent excavations at historical sites of the period relevant for our purpose, at Ujjain, Kosam and Hastinapur in the north, and Arikamedu in the south, for instance. The evidence of other important sites recently laid under excavation, has been incorporated in the text.

The classically celebrated city of Ujjayinī seems to have been originally laid out in about the sixth century B. C. when the impact of iron-using culture had made itself felt. The city standing on the river Sipra, seems to have been about a mile in length and three-quarter of a mile in width and enclosed by a huge rampart wall with a basal width of about two hundred feet. "The rampart was re-inforced against the flow of the river by transverse barriers of interlocked timbers vaguely recalling the timber work of the riverine site of Pataliputra and was subsequently revetted in part with baked brick. Outside it, where necessary, was a ditch eighty feet wide and twenty-two feet deep."[20] Earliest structures of the city seem to have been made of stone and backed brick; in the later structures however, baked and unbaked brick alone were used, and roofs were made of oblong tiles. They were all provided with soak-pits built of pottery-rings or pierced pots which became a characteristic feature of all Indian cities for more than a thousand years. Evidence has been brought to light of well laid out broad streets as well, made of rubble mixed with clay. A line of houses inhabited presumably by craftsmen and artisans has also been laid bare. A small octagonal platform made of dressed stone and belonging to a fairly early level, presumably pre-Mauryan, seems to indicate that the technique of dressing huge blocks of stone may not have been altogether unknown in pre-Mauryan times.

Recent excavations at Kauśāmbī were concerned with laying bare the rampart of the old city and determining its antiquity and its successive repairs. The earliest human habitation at the site goes back to the time before the massive defensive system of the city was built up; but no structural remains of such a habitation have been brought to light except the floor of a house in the form of a thin mud accumulation. The massive rampart was built of hard, compact and thoroughly rammed clay; the sharply sloping outer side of the rampart was revetted by burnt brick construction about nine feet thick at the base, the bricks measuring on an average, 19″ × 13″ × 2¾″ inches.[21]

Human habitation at Hastinapur before 1100 B.C. seems to have been very sporadic, but in the subsequent period, that is, from about 1100 to 600 B.C., there seems to have been considerable building activities. No structural remains have been encountered, but remains of walls of mud and mud-brick and of reed-walls with mud plaster associated with Painted Grey Ware, testify to the existence of an active community in this region during this period. The *Mahābhārata* refers to the ravages done by the flooding of the Ganga to the city of Hastinapur and subsequent shifting of the capital to Kauśāmbī. It is not unlikely therefore that the city of the period was all but washed away. In the next period, that is from c. 600 to c. 300 B.C. we come across remains of structures built of mud brick as well as of kiln-burnt brick of fairly large size (17½″ × 10″ × 2¾″), brick-lined drains and soakage jar, all found in association with Northern Black Painted Ware and comparable with that level at Kauśāmbī. In the next period, that is during the centuries immediately before and after the beginning of the Christian era, houses were made invariably of kiln-burnt brick (14½×9″×2½″), squarish brick (11″×11½″×4″) being used for the floors. They were generally oriented along the cardinal directions and there seems to have been evolved a regular system of planning. Remains of such structures have been found in association with wheel-turned, medium fabricated red wares with stamped designs assignable to the Śuṅga-Kushāṇa periods. In early mediaeval centuries Hastinapur structures seem to have been built of brick-bats collected from the remains of earlier periods.[22]

Arikamedu in Madras, the one site which was laid under considerable horizontal excavation in recent years, has yielded rich materials for a better appreciation of our secular building activities during the early centuries of the Christian era. The earliest phase of such activities is known by the remains of a fragmentary wall carrying three square blocks of brick work each supporting wooden posts, a ring well and a patch of brick-floor. What the square blocks just referred to, were meant for, is difficult to say, though one may speculate on a variety of things, since Arikamedu was an ancient sea-port. The next phase seems to have witnessed considerable building activity represented by the remains of at least two tanks, each with an adjacent room and each extensibly paved, extensive series of conduits and drains, and pavements of large bricks. Such an elaborate drainage system, some of the drains being constructed by means of corbelled walls and floored and roofed with horizontal bricks, is indeed unique in early Indian cities of the historical period. One of the two tanks "was originally paved with bricks four courses deep and plugged with clay and had a doorway in its eastern wall," for what purpose, it is difficult to say. Between the two tanks there was a long but fragmentary and unconnected wall, built upon an earlier wall which in its turn was built against rough wooden uprights. Indeed, this system of building walls against wooden posts seems to have been a characteristic feature of building technique in this city. In the next phase the essential structural features just referred to, were continued; the two tanks were elaborated, old walls were renewed and new drains or conduits added.

The most important find at Arikamedu is a featureless structure more than 150′ long. "Traces of a single partitioned-wall were found, but apart from a side chamber towards the east, the building was substantially an oblong shell, massively built and with all the appearance of a ware-house", as near the water level as was feasible and necessary. The bricks of the wall and the chamber were held together with limeless mud-mortar, but the water-side of the structure was covered with a tough plaster, obviously to keep out water. The main walls were built on rough foundations of brick which had been sunk on a rubble-bottoming into soft sand. Elsewhere at this site, for making walls and floors water-proof, the builders seem to have made use of either plaster or lime-mortar.[23]

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DESCRIPTION OF SKETCHES AND DRAWINGS

1. Sketch from the representation of a *Jātaka* story ('antelope horn'), at Sanchi; front of the north gate, west end. A Brāhmaṇa anchorite (not shown in the sketch) is seated on a stone slab before his hut roofed with leaves (*parṇaśālā*). Marshall, J.—*Monuments of Sanchi,* Vol. II, plate XVII.

2. Sketch from the representation of the *Kapi Jātaka,* at Barhut. Here the hut is fenced with a bamboo pallisade and adorned with a somewhat ornamental pinnacle. Barua, B. M.—*Barhut*: *Aspects of Life and Art,* Book III, plate LXXIX, fig. 105.

3. Sketch from the representation of the *Śyāmā Jātaka,* at Sanchi; inner face, north pillar. In the original representation two *parṇaśālās* are shown side by side, with the father and mother of Śyāmā seated on the threshold of the doors of the respective dwellings (not shown in the sketch). Marshall, J.—*Monuments* of *Sanchi,* Vol. II, plate LXVa.

4. Sketch from the representation of *Vessantara Jātaka,* at Sanchi, bottom lintel. The hut of leaves or the hermitage at Sanchi, back of northern gateway, middle section. Marshall, J.—*Monuments of Sanchi,* Vol. II, plate XXIX.

5. Sketch from the representation of the tale of the miraculous victory over the Nāga. The leafy roof of the round hut or *parṇaśālā* has been very clearly depicted. Sanchi, south pillar of eastern gateway. Marshall, J.—*Monuments of Sanchi,* Vol. II, plate LIIa.

6. Sketch from the representation of the visit of Ajātaśatru to the Buddha, at Amaravati. Entrance door, boundary wall etc. of *kuṭī* or hut are shown. Sivaramamurti, C.—*Amaravati Sculpture,* plate XXXV, 2b.

7. Sketch from the representation of the story of *Vessantara Jātaka,* showing a *kuṭī* or hut made of reeds and grass. *Stūpa* railings at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture,* plate LXXIII, fig. 5.

8. Sketch from the representation of Ajātaśatru's visit to the Buddha in the bamboo grove, at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture,* plate LXIII, fig. 5.

9. Sketch of a roof made of leaves, at Sanchi. Western gateway pillar. Marshall, J.—*Monuments of Sanchi,* Vol. II, plate LXIV CM.

10. Sketch from the representation of the *Losaka Jātaka*; the story of Mittavindaka, the unfortunate one. In the original panel a village is indicated. Thatched huts with *śalākā-vātāpana*, at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture*, plate XLVI, fig. 2.

11. Sketch of a representation of a leafy hut of reeds and grass, at Amaravati. Sivaramamurti, C.-*Amaravati Sculpture*, plate XI, fig. 14.

12. Sketch from the representation of the story of Kavikumāra, at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XLVIII, 2b4.

13. Sketch from the representation of a hermitage, at Mathura. Vogel, J. Ph.—*Mathura Sculpture*, in *Ars Asiatica*, Vol. 15, pl. LXa.

14. Sketch from the representation of the *Nalinīkā* or the *Alambusa Jātaka*, at Barhut. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, Book III, plate LXXXVIII, fig. 131.

15. Sketch from the representation of the scene of *Bhisa Jātaka*, at Barhut. Barua, B.M.—*Barhut: Aspects of Life and Art*, Book III, plate LXXXVI, fig. 127.

16. Sketch from the representation of the story of the gift of the Jetavana, at Sanchi. Northern gateway pillar. Marshall, J.—*Monuments of Sanchi*, Vol. II, plate XXXIVa, fig. 2.

17. Sketch from the representation of the *Maṇikaṇṭha Jātaka*. The ground plan of this *kuṭī* is square with a curvilinear roof on which a finial can be seen. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, Book III, plate LXXVIII, fig. 106.

18. Sketch from the representation of an ornamental house-type, in a twelfth century manuscript painting, from eastern India.

19. Sketch from the representation of an ornamental house-type illustrated in a twelfth century manuscript painting from eastern India.

20. Sketch from the representation of a shrine adopted from a dwelling house type, at Mathura. Vogel, J. Ph.—*Mathura Sculpture*, in *Ars Asiatica*, Vol. 15, plate LV, fig. b.

21. Sketch from the representation of the *Sarabhaṅga Jātaka*, at Barhut. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, plate LXXXVI, fig. 130.

22. Sketch from the representation of the scene of offering honey to a *pratyeka* Buddha by a trader, at Barhut. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, Book III, plate XCV, fig. 143.

23. Sketch from the representation of the *Gahapati Jātaka*, at Barhut. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, plate LXXVI, fig. 102.

24. Sketch from the representation of the *Kapota Jātaka*, at Barhut. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, Book III, plate LXXIII, fig. 94.

25. Representation of a two-storeyed façade, with central *dvāra-koṭṭhaka*, at Mathura. Vogel, J. Ph.—*Mathura Sculpture*, in *Ars Asiatica*, Vol. 15, plate VIIIc.

26. Sketch from the representation of the story of Kavikumāra, at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XLVIII, 2a.

27. Sketch from the representation of an upper storey of a *pāsāda*, north side, outer pillars, at Mathura. The central arched window is partly open; the two square latticed windows (*jāla-vātāpana*) are on the recessed wall of the *kuṭāgāra*. The roof is here tiled. Vogel, J. Ph.—*Mathura Sculpture*, in *Ars Asiatica*, Vol. 15, plate XXb, 27.

28. Sketch of a *parṇaśālā* or hut with thatched roof, at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture*, plate XI, 18.

29. Sketch from the representation of a tiled house on the reliefs on the ground balustrade, *Stūpa* II, at Sanchi. In the original the elephant with rider is coming out of the house. "The triangular opening in roof to increase the height and allow the rider to pass through, is noticeable." Marshall, J.—*Monuments of Sanchi*, Vol. III, plate XC, fig. 86A.

30. Sketch from the representation of a *pramodāgāra* or pleasure palace, at Mathura, showing the continuation of the façade in a line with the *pākāra*, *aṭṭālaka*, or defence towers to right and left. A part of the *toraṇa* is shown on the right. The palace is three storeyed and the *kuṭāgāra* or *uttamāgāra* is roofed with tiles. Coomaraswamy, A. K.—*Eastern Art*, Vol. III, 1931, pl. XLIV, fig. 13.

31. Sketch from the representation of a procession towards the Bodhi tree, at Barhut. A two storeyed palace is shown along with *vātāpanas* of the *kuṭāgāra*, and finials on the *kuṭa*. The pillars of the lower storey are also shown. Barua, B.M.—*Barhut*: *Aspects of Life and Art*, pl. XLIII, fig. 40.

32. Sketch from the representation of the city of Rājagṛiha, at Sanchi, north *toraṇa*, showing a royal entourage issuing through the city gate, city wall to the left and city or palace buildings inside. Coomaraswamy, A. K.—*Eastern Art*, vol. III, pl. CXXIV, fig. 11.

33. Sketch from the representation of the scene of the War of the Relics; back of southern gateway; middle section of the architrave. A besieged city is shown, with the ditch in the foreground; the walls are made of large-sized bricks or perhaps dressed stones. Notice also the battlements, the merlons and balconies. Marshall, J.—*Monuments of Sanchi*, vol. II, pl.

34. Sketch from the representation of the rounded roof of an apsidal temple on the corner pillar of *Stūpa* III, at Sanchi. Marshall, J.—*Monuments of Sanchi*, vol. III, pl. XCIII, fig. 9.

35. Sketch from the representation of the city of *Śrāvastī*, at Sanchi; north gateway pillar. Marshall, J.—*Monuments of Sanchi*, vol. II, pl. XXXIV, 2b.

36. Sketch from the representation of a square *bodhi-ghara* with tall slender pillar, at Amaravati. Coomaraswamy, A. K.—*Eastern Art*, vol. II, pl. XXXIV, 2b.

37. Sketch from the representation of a *śivikā-garbha*, at Mathura. Vogel, J. Ph.—*Mathura Sculpture*, in *Ars Asiatica*, No. 15, pl. LIXb.

38. Sketch from the representation of a circular *bodhi-ghara*, at Barhut, showing formation of pillars. A *dhaja thabha* (*dhvaja-stambha*) stands in front with an elephant capital. Coomaraswamy, A. K.—*Eastern* Art, vol. II, pl. CXXVIII, fig. 22.

39. Sketch from the representation of the scene of Prasenjit's last visit to the Buddha. A two-storeyed house with finials at the top and balconies. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, pl. L, fig. 52.

40. Sketch from the representation of Suddhodana's visit to Māyā in the Aśoka grove, at Amaravati. A two-storeyed building with double *toraṇa*, *śālā*, *alinda* and also the finials at the top. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XXVII, fig. 1.

41. Sketch from the representation of the scene of Viḍuḍabha's march towards Kapilavāstu, at Barhut, showing a two-storeyed building and main house-gate. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, pl. LI, fig. 53.

42. Sketch from the representation of the Vaijayanta palace and Sudharma hall of the gods of the thirty-three heavens. A three storeyed building with an outer gate-house, the entrance and the *alindas*, at Barhut. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, pl. XLII, fig. 39.

43. Sketch from the representation of the scene of congratulation of the Buddha on his attainment of Buddhahood by the Rūpa-brahmas, at Barhut. A three-storeyed building (*ti-bhūmika pāsāda*) with *alindas* and the finials. The main building with different *talas* (floors) are supported on pillars. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, Book III, pl. XLIII, fig. 41.

44. Sketch from the representation of the *Vidhura paṇḍita Jātaka*, at Barhut. A *ti-bhūmika pāsāda* with door-ways, and finials at the top. The weight of each storey is supported by pillars resting on the floor below. The small key hole on the wall of the rooms may be functional or decorative. Barua, B. M.—*Barhut*: *Aspects of Life and Art*, Book III, pl. XCI, fig. 136.

45. Sketch from the representation of the Vaijayanta palace and Sudharma Hall, at Barhut. A three-storeyed building (*ti-bhūmika pāsāda*) with *alindas* on each floor, at Barhut. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, pl. XLII, fig. 39.

46. Sketch from the representation of a three-storeyed building, with a single *alinda* at the top, at Sanchi. Back panel. Marshall, J.—*Monuments of Sanchi*, Vol. II, pl. LXIII, middle lintel.

47. See fig. 45 and description.

48. Sketch from the representation of the ornamental designs of the *alindas* in the upper half medallion of a railing pillar at Barhut. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, pl. XVII, fig. 22.

49. Sketch from the representation of the story of the king who chopped his son into bits, at Amaravati. A *gṛiha-dvāra-toraṇa* with door-leaves or *kavāṭas*. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XXXVII, fig. 2.

50. Sketch from the representation of a terraced building with *alinda*, at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XXIV, fig. 1.

51. Sketch from the representation of a walled city with the gate-house on the right side, at Mathura. The door-leaves are shown. Outside the city wall there is an apsidal shrine. Vogel, J. Ph.—*Mathura Sculpture*, in *Ars Asiatica*, Vol. 15, pl. XXIIIa.

52. Sketch from the representation of the story of Thirty-three gods, at Sanchi, showing a two-storeyed house with barrel-vaulted roof and resting on pillars that enclose the lower hall. The *vedikās* and the *gavāksha* on the top-floor is noticeable. The roof is presumably made of thatch and bamboo, and hence protected by bamboo-bindings against storms and

high winds, a practice that still persists. Marshall, J.—*Monuments of Sanchi*, vol. II, pl. XVIII, b.3.

53. Sketch from the representation of the scene of *Vidhura paṇḍita Jātaka*, at Barhut, showing a two-storeyed building with finials at the top. Barua, B. M.—*Barhut: Aspects of Life and Art*, Book III, pl XCI, fig. 136.

54. Sketch of a representation, at Mathura, of two buildings side by side, one at a higher level than the other, but connected by a sloping wooden staircase. The sketch shows *vedikās* and staircase tower. Coomaraswamy, A. K.—*Eastern Art*, vol. III, pl. XCIV, fig. 12.

55. Sketch fom the representation of the *ardhatala* or the mezzanine floor of a palace, at Barhut. The upper storey is supported on rows of pillars resting on the floor below. Barua, B. M.—*Barhut: Aspects of Life and Art*, pl. XLIV, fig. 42.

56. Sketch from the representation of the upper storey of a *pāsāda*, at Mathura. In the centre there is a false arched door with shutters which are not indicated in the sketch. On either side, there is a latticed window in the *kuṭāgāra* wall. Coomaraswamy. A. K.—*Eastern Art*, vol. III, pl. CV, fig. 49.

57. Sketch from the representation of the upper storey of a *pāsāda*, at Mathura, showing three arched windows with *kavāṭas*, the central one with a rolled blind (*chakka*). Coomarswamy, A. K.—*Eastern Art*, vol. III, pl. CV, fig. 48.

58. See fig. 31.

59. Sketch from the representation of an upper storey, at Sanchi. Marshall, J.—*Monuments of Sanchi*, vol. II, pl. XLIX.

60. Sketch from the representation of the *Chaddanta Jātaka*, at Amaravati, showing palace, gate-house and part of the city or palace wall. Sivarama murti, C.—*Amaravati Sculpture*, pl. LI, fig. 1.

61. See fig. 51.

62. Sketch from the representation of the scene of Partition of the Buddha's Relics, Kuśīnārā, at Amaravati. A Malla chieftain riding on an elephant, is seen emerging with a reliquary from the gate-house of the city. A defence tower on the foreground forms a part of the wall which is extending downward. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XLIII, fig. 1.

63. Sketch from the representation of the scene of War of the Relics, at Sanchi. Back of the western gateway; middle section: walled city with

defence tower on the right. The Mallas are entering the city through the gate house. Immediately behind the *nagara-dvāra-toraṇa,* there is a gate-house of the usual type. The moat is suggested by lotuses. Marshall, J.—*Monuments of Sanchi*, Vol. II, pl. LXI.

64. Sketch from the representation of a walled city having a main gate, and another gate within the city. The buildings within the city can be seen with their *alindas* and the recessed *kuṭāgāras.* Coomaraswamy, A. K.—*Eastern Art*, Vol, III, pl. XCII, fig. 3.

65. Sketch from the representation of the story of the Mahābhinishkramaṇa, at Sanchi; front of the eastern gateway, middle section. The *bahi-dvāṛa-toraṇa* lay at some distance from the palace. Marshall, J.—*Monuments of Sanchi*, Vol. II, pl. XL, middle lintal.

66. Sketch of a city gateway with *śālās, aṭṭālas, koṭhāgāra* and *pākāra,* at Amaravati. Sivaramamurti, C.—*Amaravati Sculpture*, pl. XI, fig. 7.

67. Sketch from the representation of the story of the War of the Relics, at Sanchi, on the south *toraṇa*, showing the gate-house of the usual type on the left and a second gate on the right. The part of the city-wall, the moat and the buildings within the city can also be seen. Coomaraswamy, A. K.—*Eastern Art*, Vol. II, pl. II, fig. 6.

68. Sketch from the representation of an octagonal *bodhi-ghara*, at Sanchi, east *toraṇa.* Coomaraswamy, A. K.—*Eastern Art*, Vol. II, pl. IX, fig. 28.

69. Sketch from the representation of another octagonal *bodhi-ghara*, at Sanchi, on the east *toraṇa.* Coomaraswamy, A. K.—*Eastern Art*, vol. II, pl. IX, fig. 27.

70. Sketch from the representation of the scene of the return of the Perfectly Accomplished Buddha to his native town, at Sanchi, showing the city of Kapilavāstu with the outer wall, gate-house and the buildings inside. Marshall, J.—*Monuments of Sanchi*, Vol. II, pl. L, fig. a1.

71. Sketch from the representation of the Uruvilva village, at Sanchi, *Stūpa* I. The bas-relief on the south pillar of eastern gateway gives us a comprehensive picture of the village of Uruvilva, where dwellings both of the rich (buildings, *aṭṭālakas*) and of the poor (*kuṭīs*) are shown. Herds of cows, buffaloes and goats are seen among the houses. Outside the village proper there is an apsidal shrine. In front of the building seems to be the village gateway. Marshall, J.—*Monuments of Sanchi*, Vol. II.

72. Sketch from the representation of the façade of the Lomaśa Ṛishi cave at Barabar hills, in Bihar. Brown, Percy—*Indian Architecture: Buddhist and Hindu*, pl. VII, fig. 1.

73. Sketch from the representation of the rock-cut imitation of planking at the Sudāmā Cave, at Barabar hills in Bihar. Brown, Percy—*Indian Architecture: Buddhist and Hindu*, pl. VII, fig. 2.

74. Sketch from the representation of a hut made of reeds (*parṇakuṭī*), at Begram. *Ibid.* pl. VII, fig. 45.

75. Sketch from the representation of the interior of the rock-cut Sudāmā Cave. A comparison and a very close affinity with contemporary mud houses of Bengal (Bankura, Birbhum and Midnapur districts) is at once suggested. Brown, Percy—*Indian Architecture: Buddhist and Hindu*, pl. VII, fig. 3.

76. Sketch from the representation of the façade of a *chaitya* hall, on a terracotta medallion found at Bhita.

77. Sketch of the two granaries shown in relief on the Sohagaura copper plate, *c.* second century B.C. The round base which is not shown in the sketch, with the curvilinear roof shows very close affinity with modern granaries found at different places in India, especially in Bengal.

78. Sketch from the representation of a *toraṇa*, at Begram. "It is ornamented with special carved decorations, a kind of vertical Greek key-pattern, a horizontal 'L' and circles; it is possible that these were metal inlays, handles and knockers. The door is always a-jar, and one can sometimes make out through the opening, one or two elements which might well be the bars for securing the doors (*Palighā*, Skt. *parighā*) mentioned in *Buddhacharita*, v. 82." Auboyer, Jeanine—Ancient Indian Ivories from Begram, Afghanistan, in *Journal of the Indian Society of Oriental Art*, vol. XVI, 1948, pl. VII, fig. 44.

79. Sketch from the representation of a *di-bhūmika pāsāda* with an arched door and latticed wondows. *Ibid.* pl. VII, fig. 45.

80. Sketch from the representation of a simple gateway, at Begram. Here "the capitals support the arch and the spacing of the *stambha* is ensured by a straight lintel or by hoops". *Ibid.* pl. VII, fig. 49.

81. Sketch from the representation of a *toraṇa* at Begram. "The *stambhas* reach under the porch. They are assembled by means of more or less stylised hoops and connected to the porch by cylindrical cross-pieces." *Ibid.* pl. VII, fig. 50.

82. Sketch of a typical Angami Naga house, showing the slanting type with two horns in the centre. The house-horns known as *kika* are continued into two great massive horns which may signify the status of the dweller. It is constructed by setting up eight posts, four on each side, with four higher corresponding posts, to bear the roof trees down the centre of the house. The posts, both upright and horizontal, are merely trees roughly trimmed. The walls seem to be made of split bamboo placed horizontally.

83. Sketch of a Purum hut with slanting roofs thatched with straw.

84. Sketch of a *kemove's* house with wooden shingle roof and a pair of house-horns, from the NEFA region.

85. Sketch of a blacksmith's workshop as seen in any village in Bengal.

86. Sketch of a cowshed as seen in any village in Bengal. In both instances the roof is of the lean-to type.

87. Sketch of an Oraon house. The hut is of split bamboo and sloping roof is of thatches of wild grass supported on posts. Beams and rafters are made mostly of *śāla* wood.

88. A typical wagon-headed or half-barrel shaped hut of the Todas. Nilgiri district. The house is rectangular and the roof is supported on the four upright pillars. The house is without any window and the door-way is so small that one has to crawl through to enter the house.

89. A linear type village lined by houses roofed with palm leaf.

90. A purely round hut with conically round roof of a primitive tribe in the Waltair district. The roof is covered with palm or coconut leaf.

91. An agglomerated village type. Waltair, Andhra.

92. Ordinary hut of Irlas, showing round base and conically round roof made of thatch or grass or palm or coconut leaf. Tirumalai district, Madras.

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94. A round based *golāghar* with conically round roof. West Bengal.

95. A linear type village, at Tangi, near Chilka, Orissa.

96. A typical village *golā-ghar* or granary with a round base and round conical roof, resting on a raised platform. The walls are made of pleated bamboo and reinforced by horizontal stripes of bamboo and vertical bamboo posts.

97. A round based *golāghar* with a conically round roof covered with thatch. The walls are made of bamboo. West Bengal.

98. A linear type village, on the banks of the Chilka, Orissa. Thatch roofed rectangular houses with projected eaves resting on bamboo posts.

99. Typical house-types and arrangements in Birbhum, showing rectangluar construction with double roof of curvilinear shape. Birbhum, West Bengal.

100. A double-roofed rectangular house with a verandah in front. West Bengal.

101. A doubled-roofed house of curvilinear shape. West Bengal.

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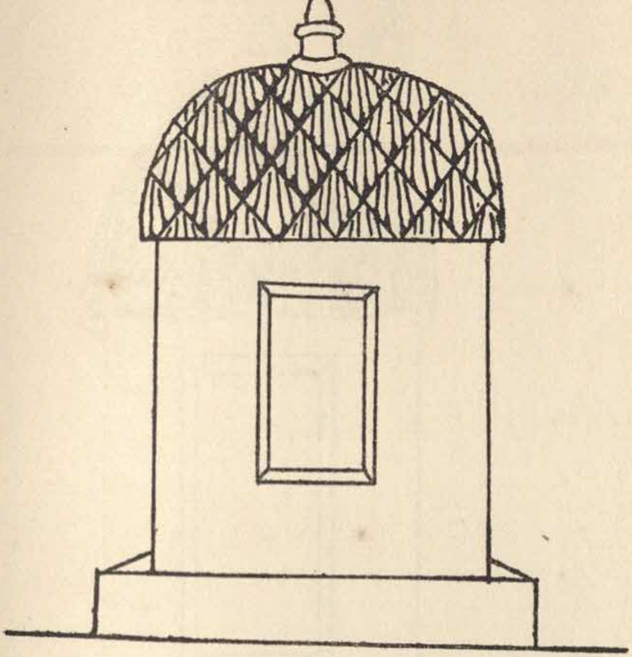

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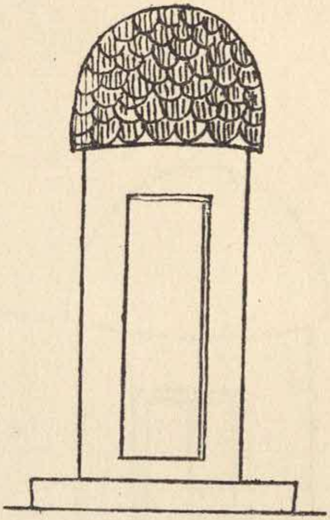

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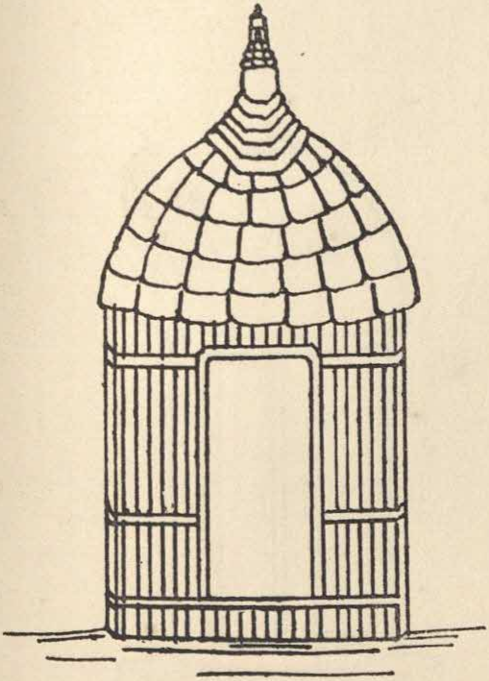

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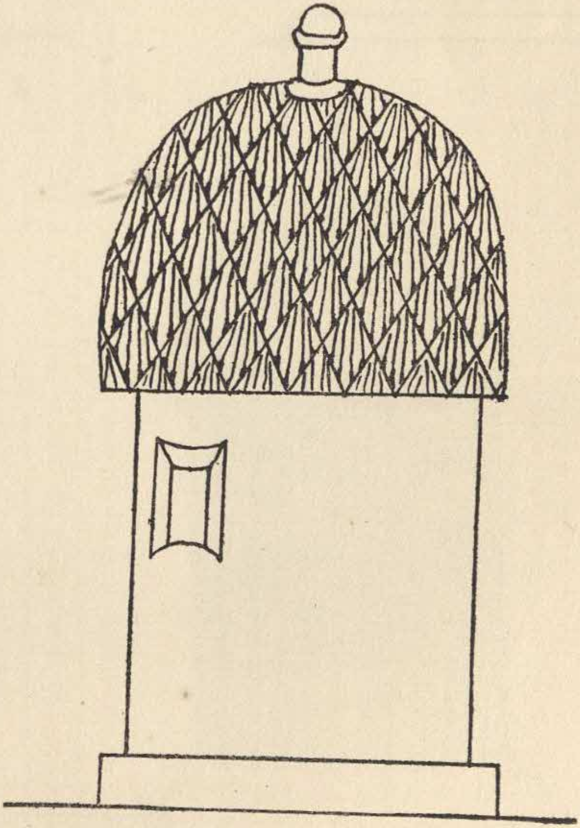

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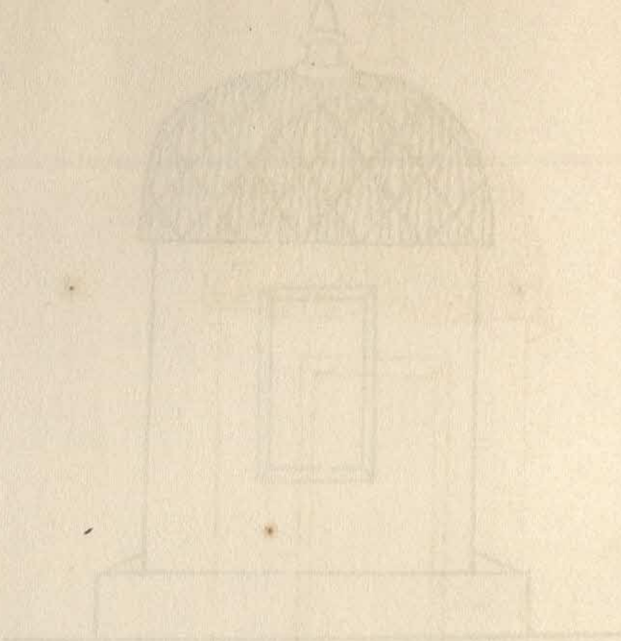

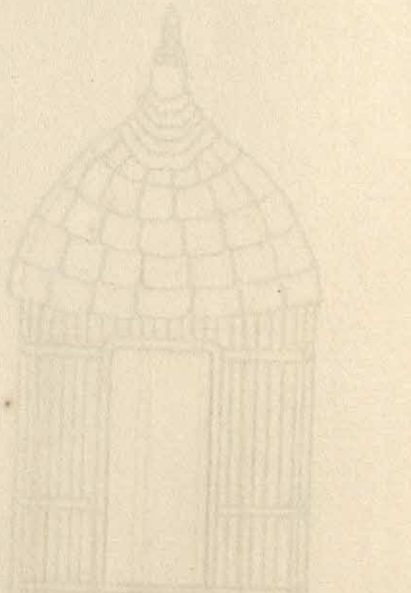

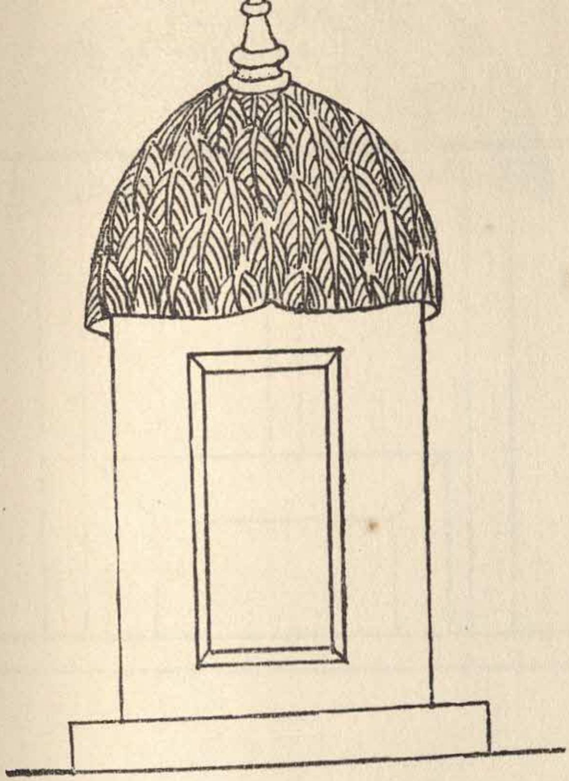

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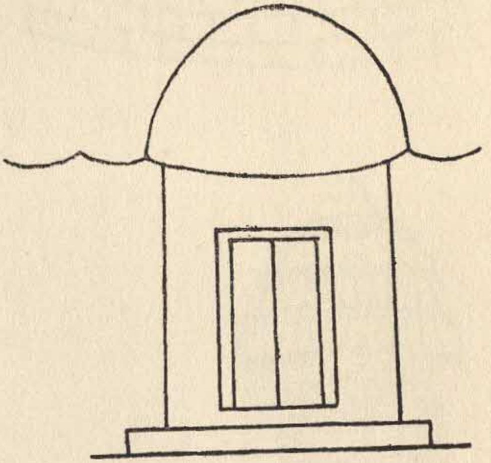

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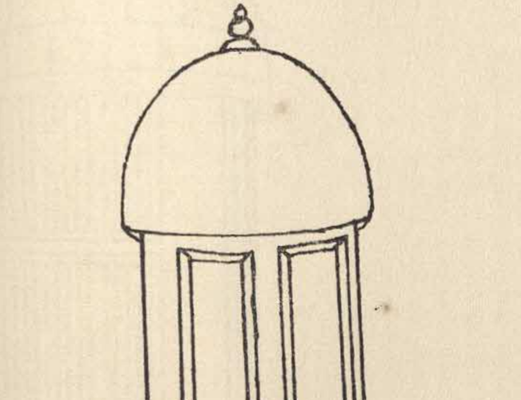

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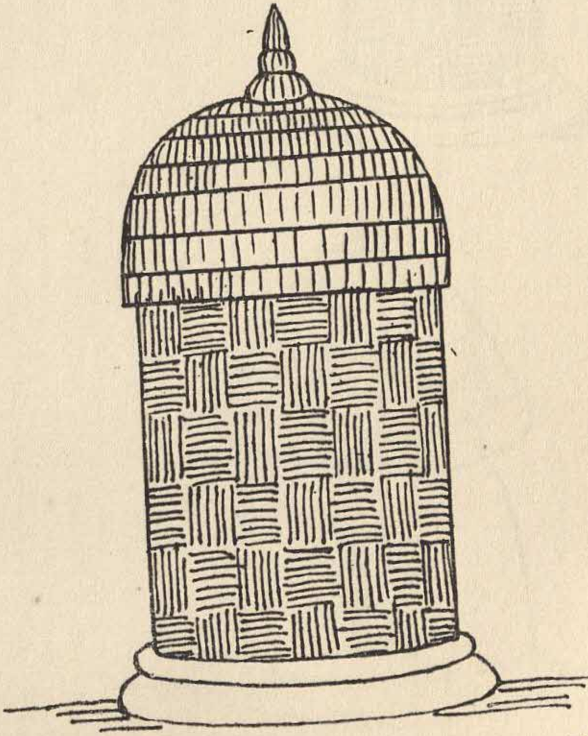

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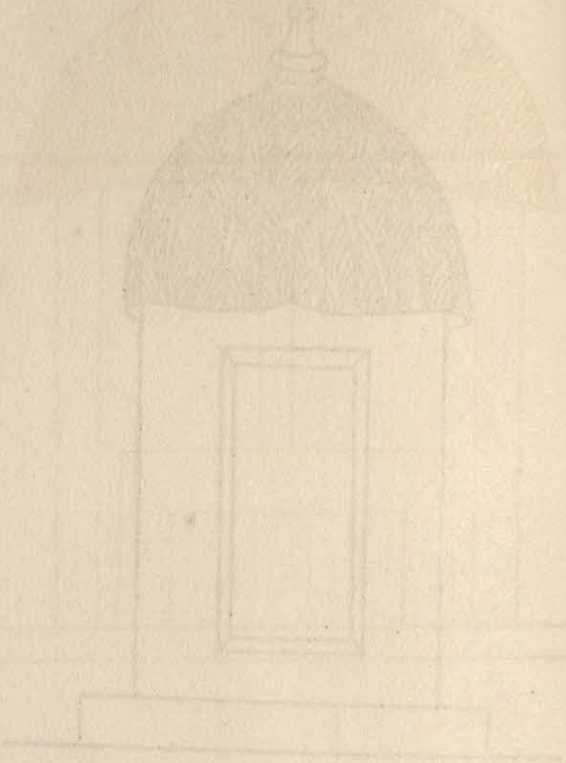

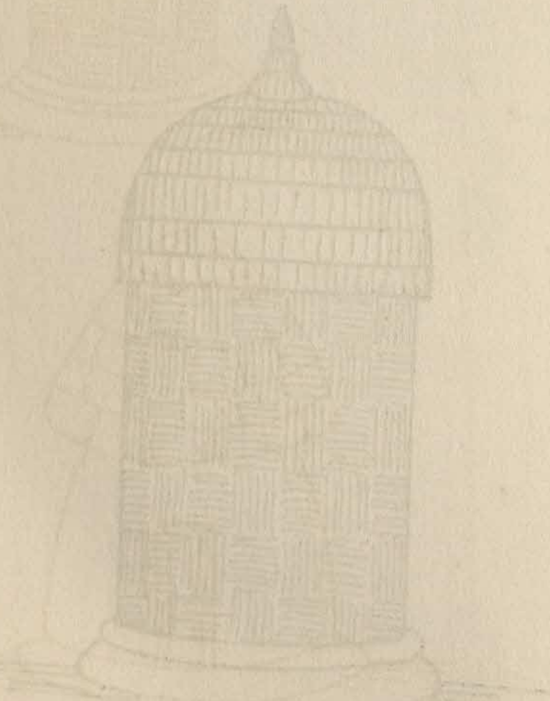

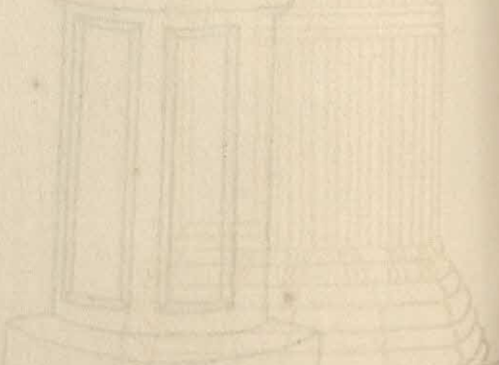

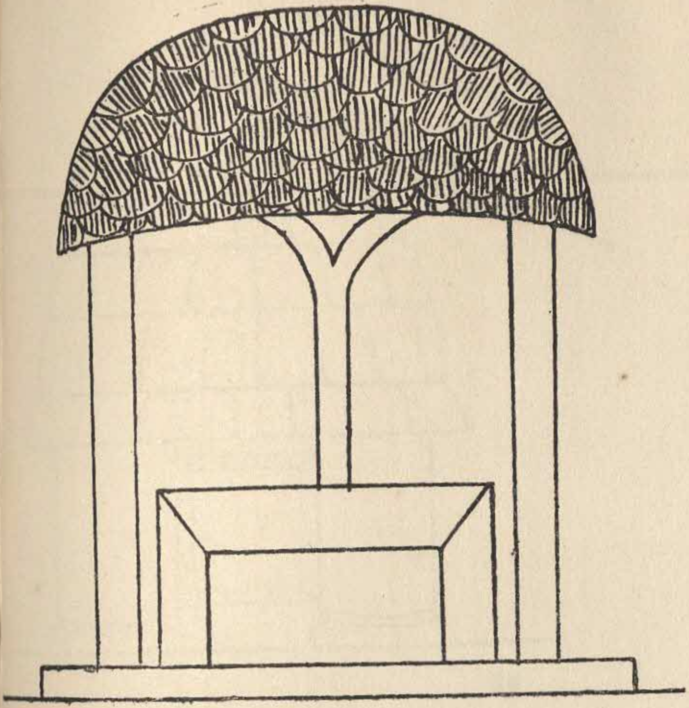

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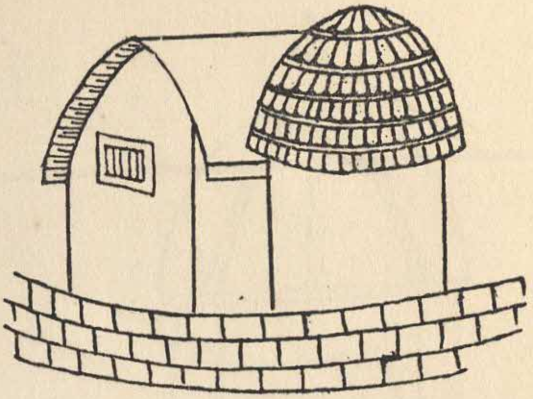

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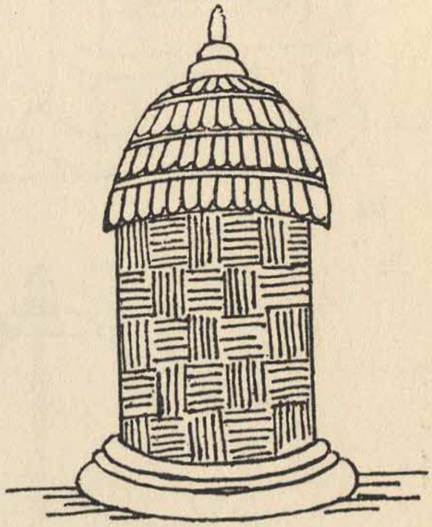

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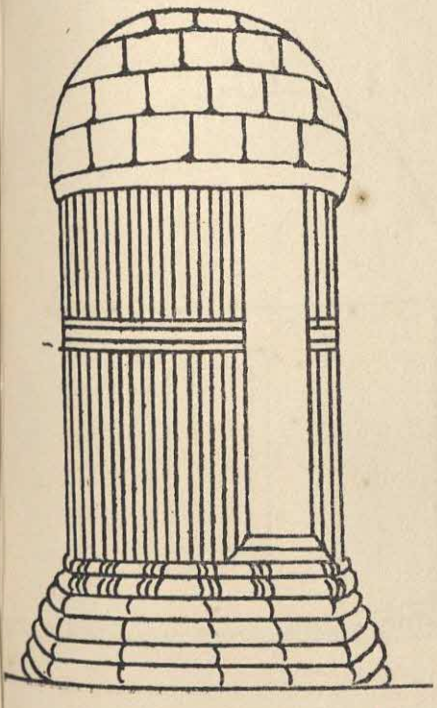

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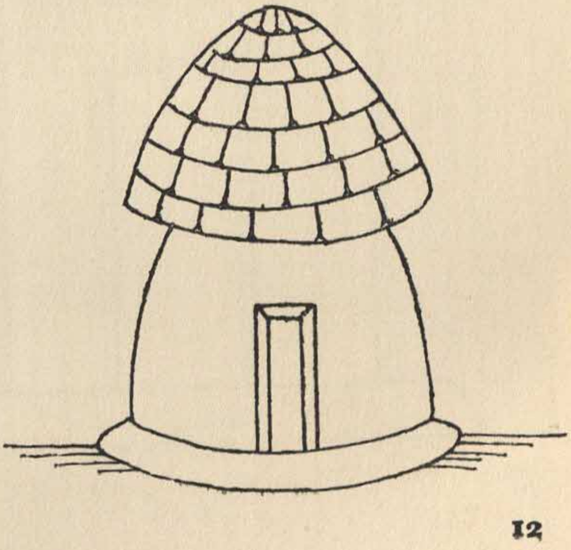

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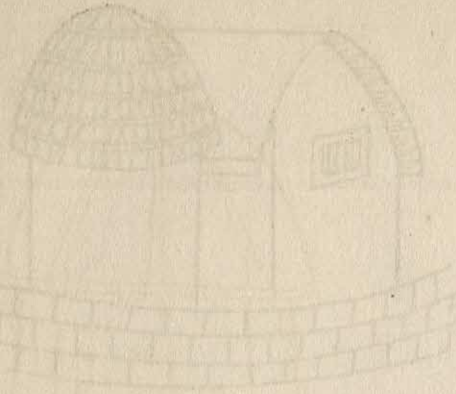

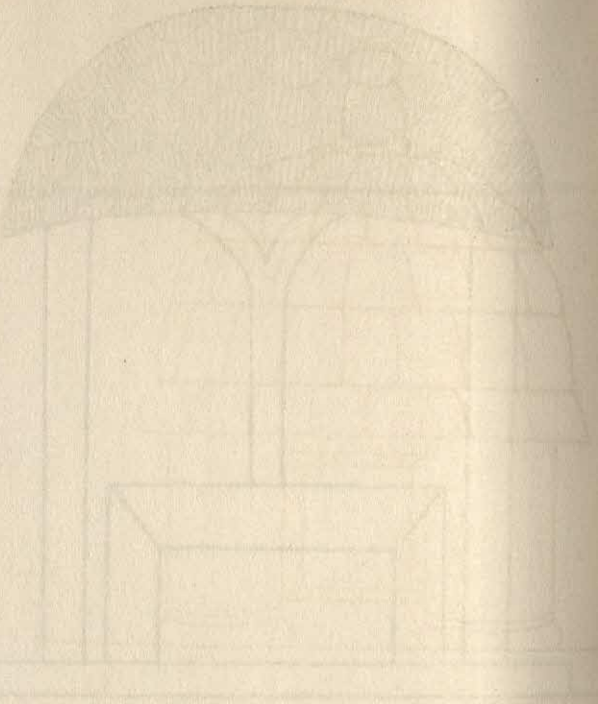

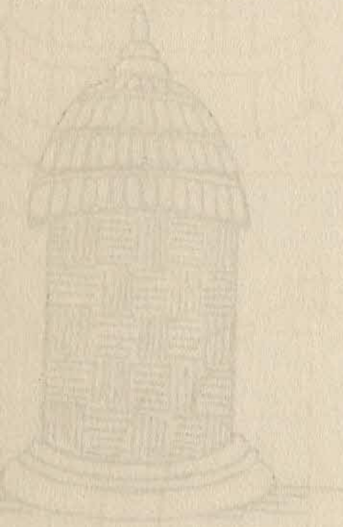

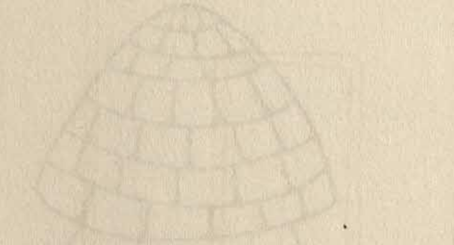

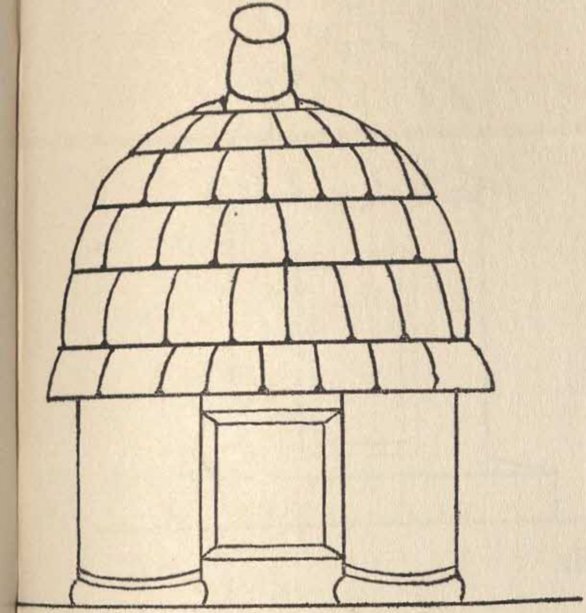

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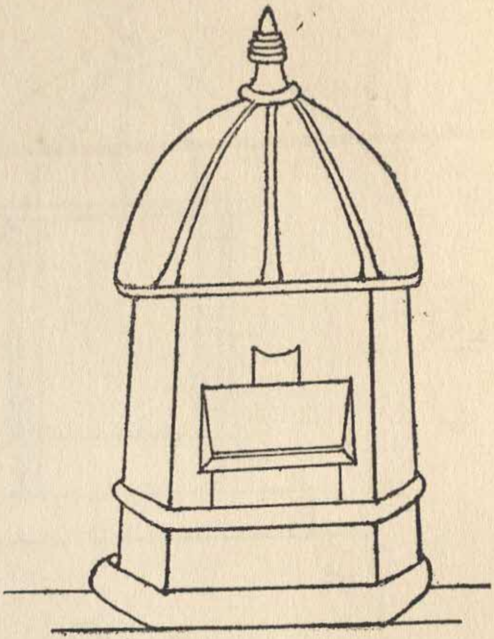

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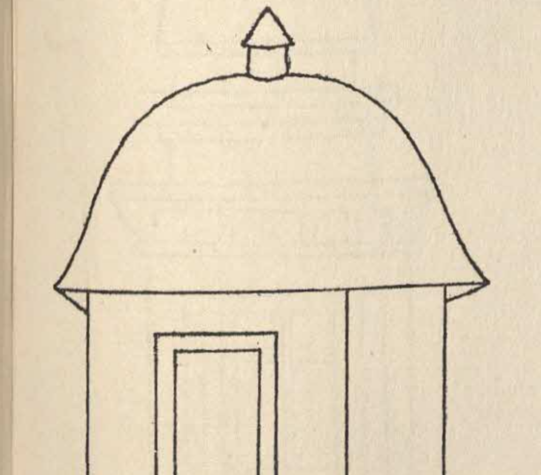

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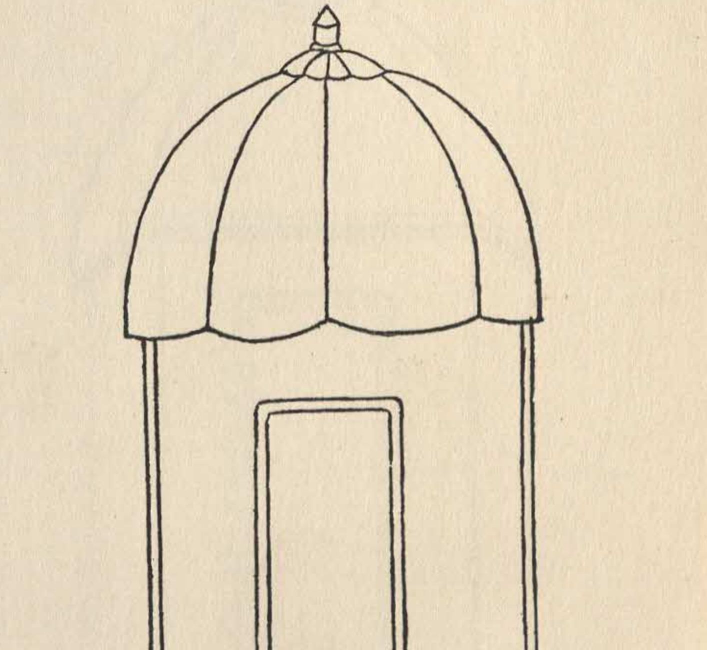

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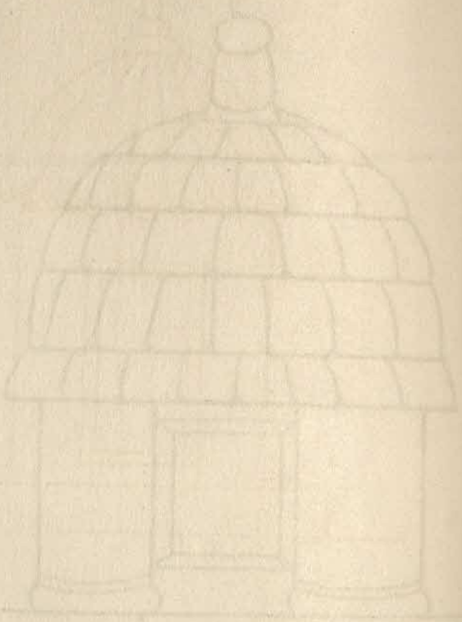

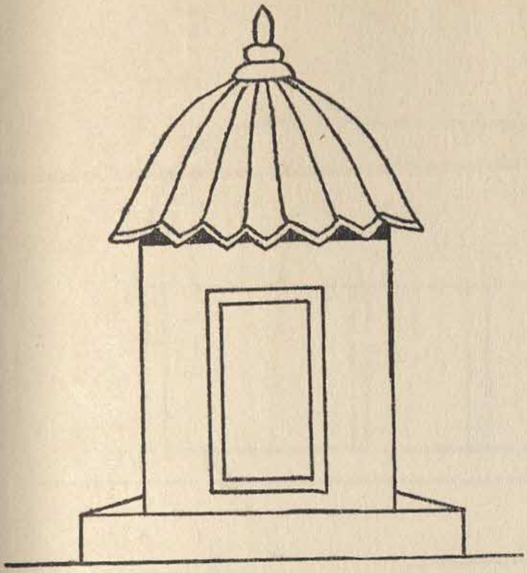

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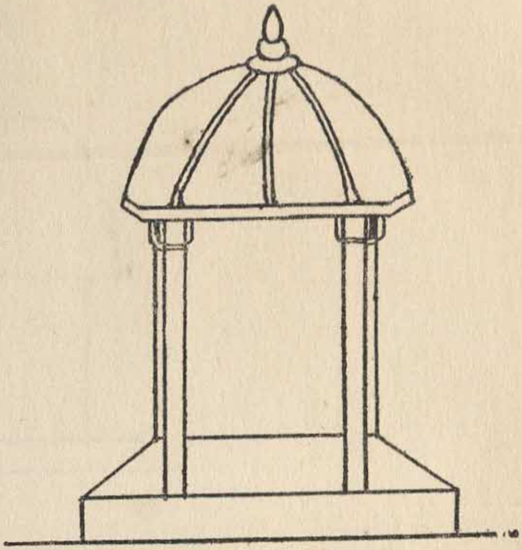

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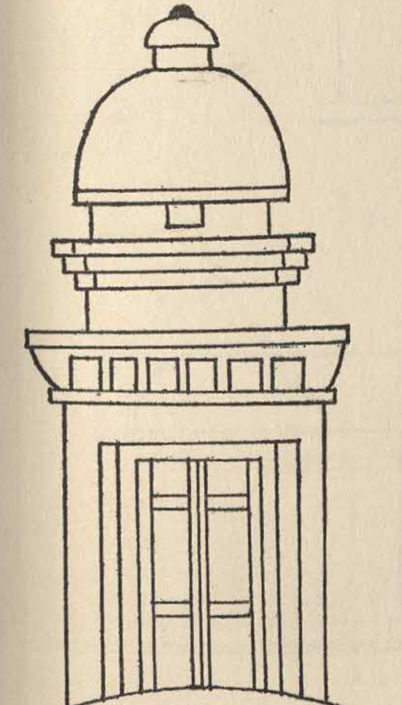

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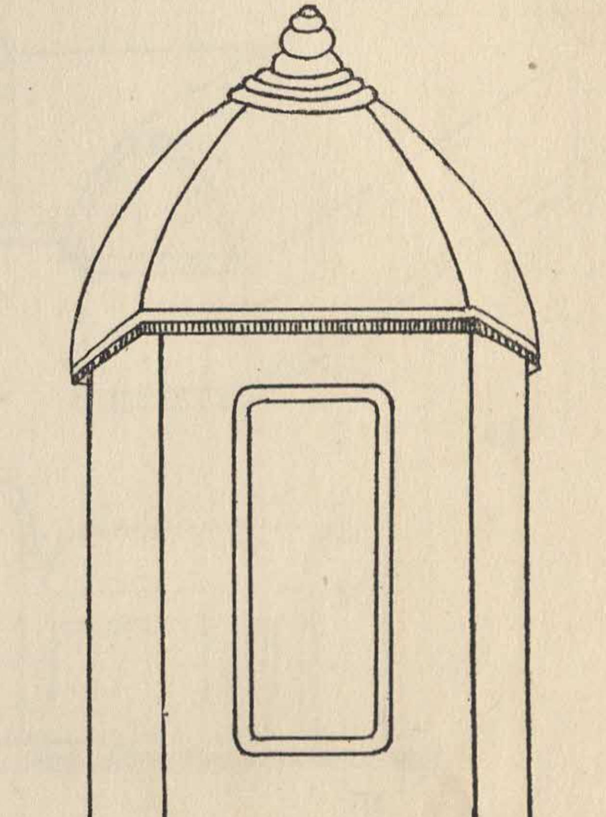

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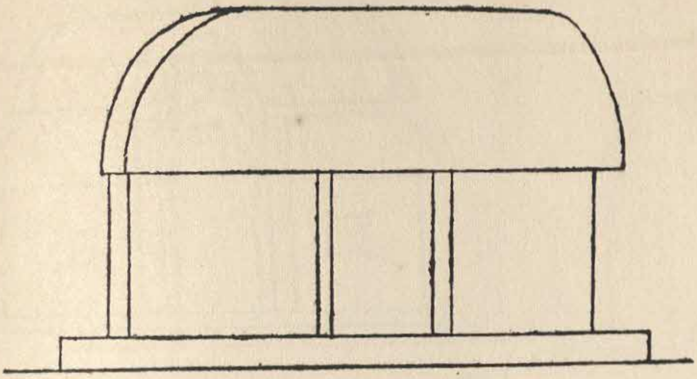

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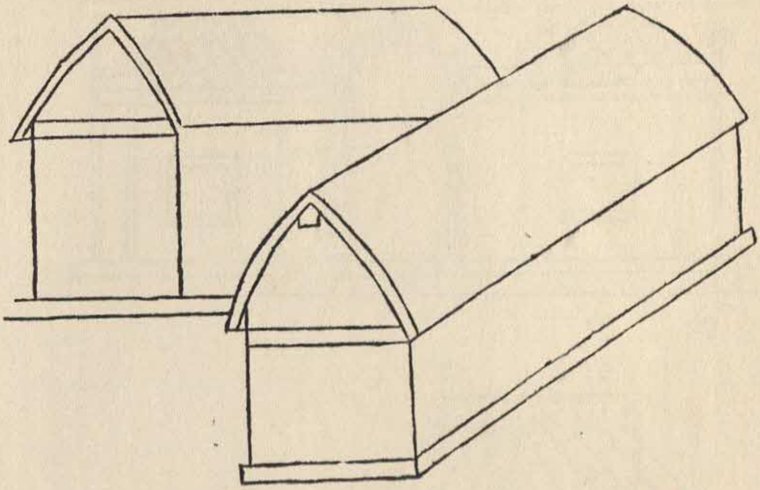

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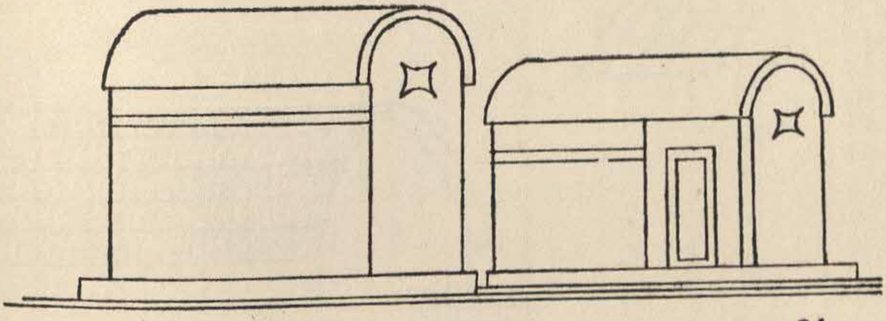

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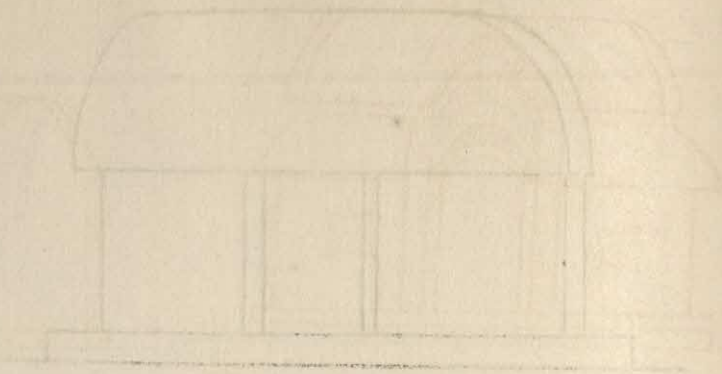

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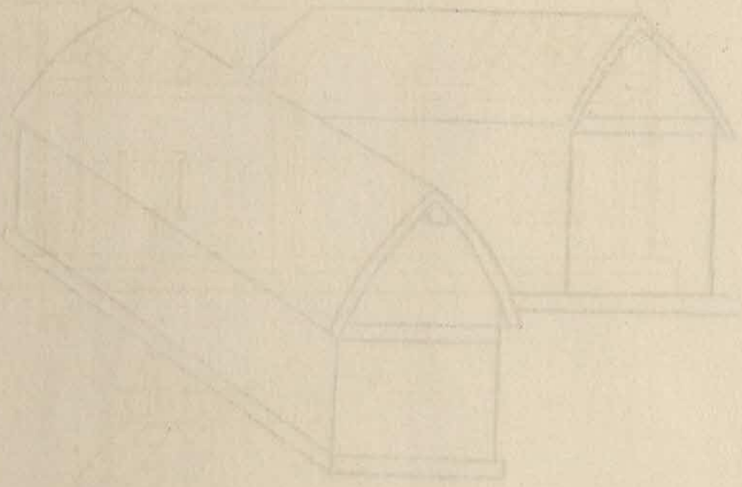

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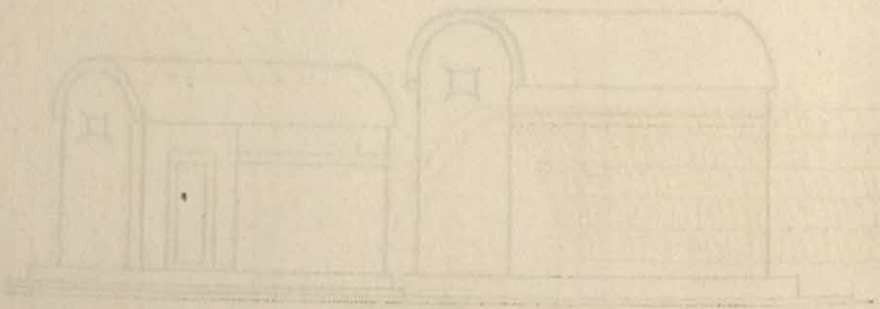

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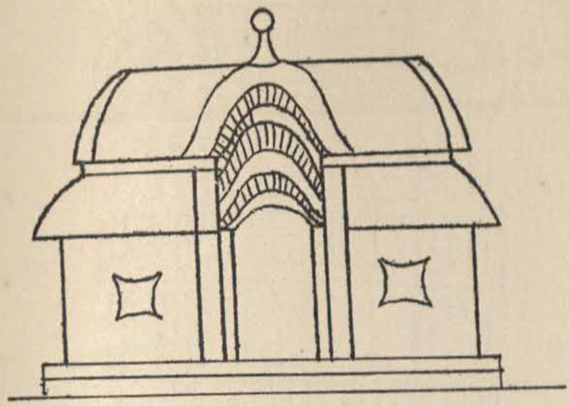

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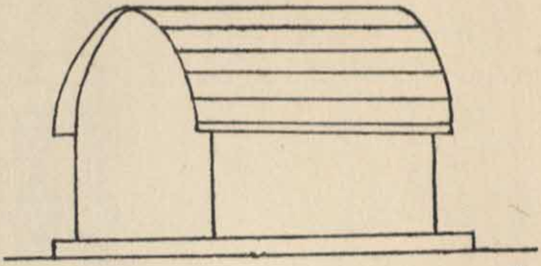

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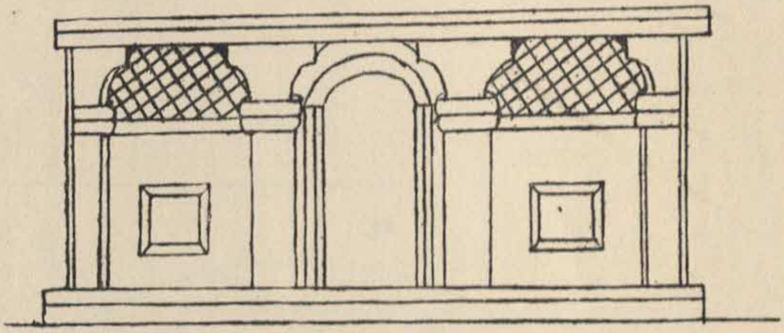

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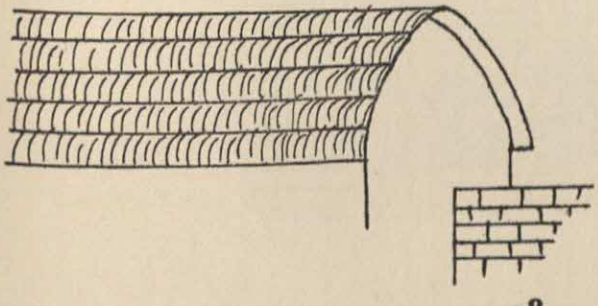

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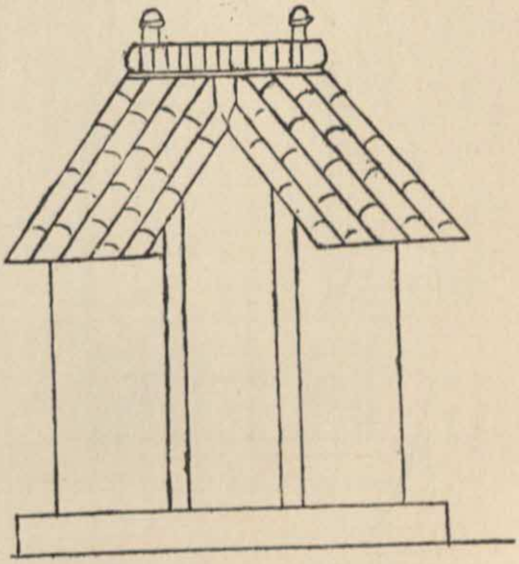

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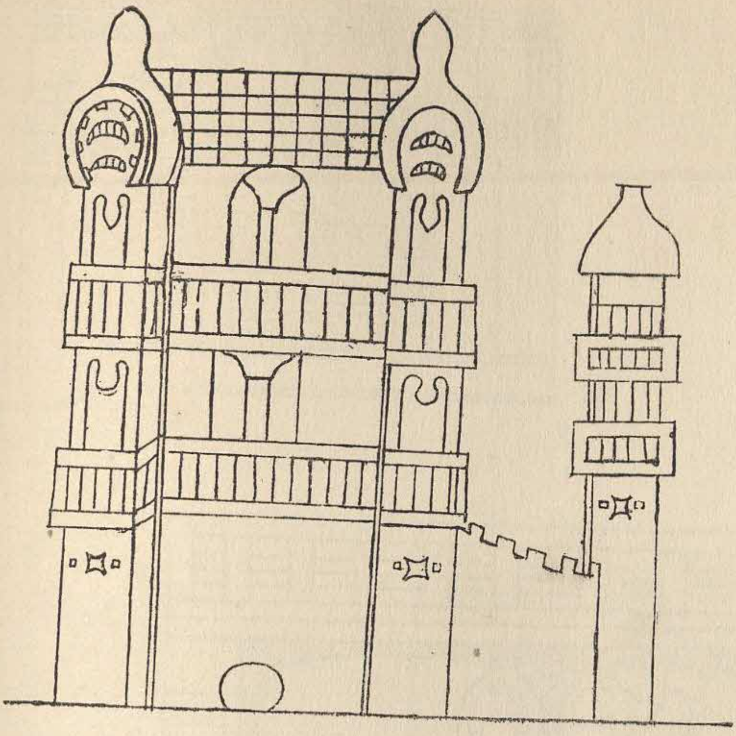

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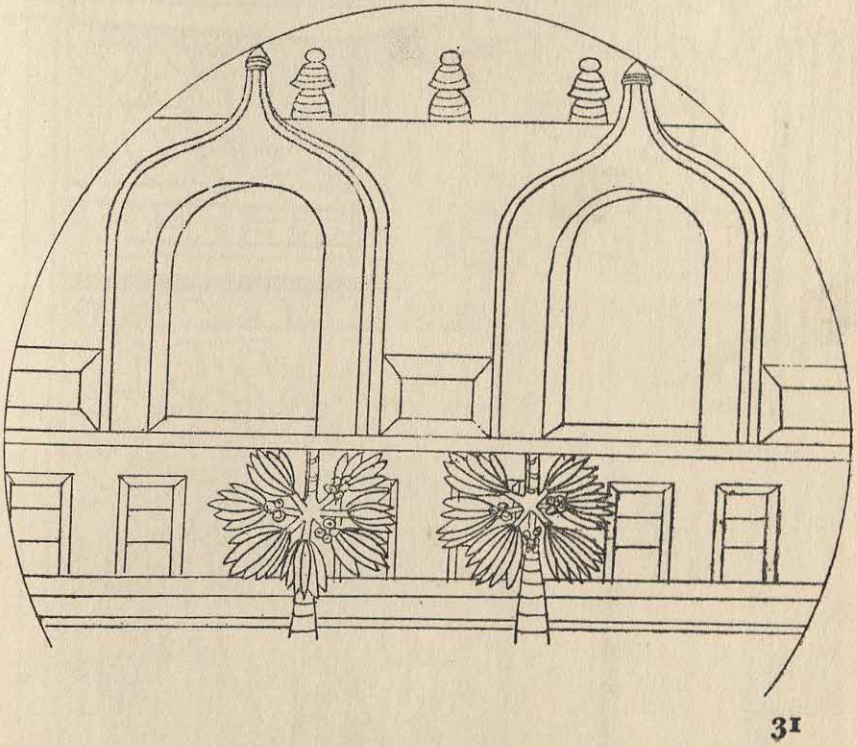

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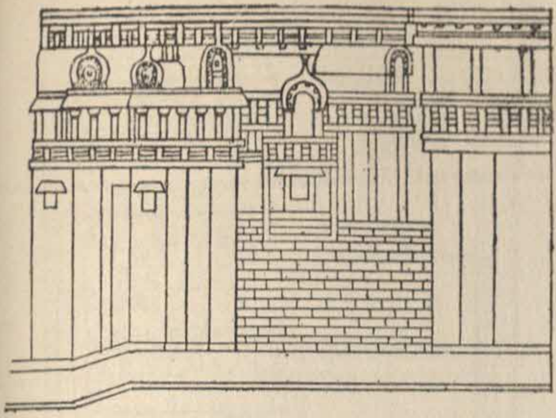

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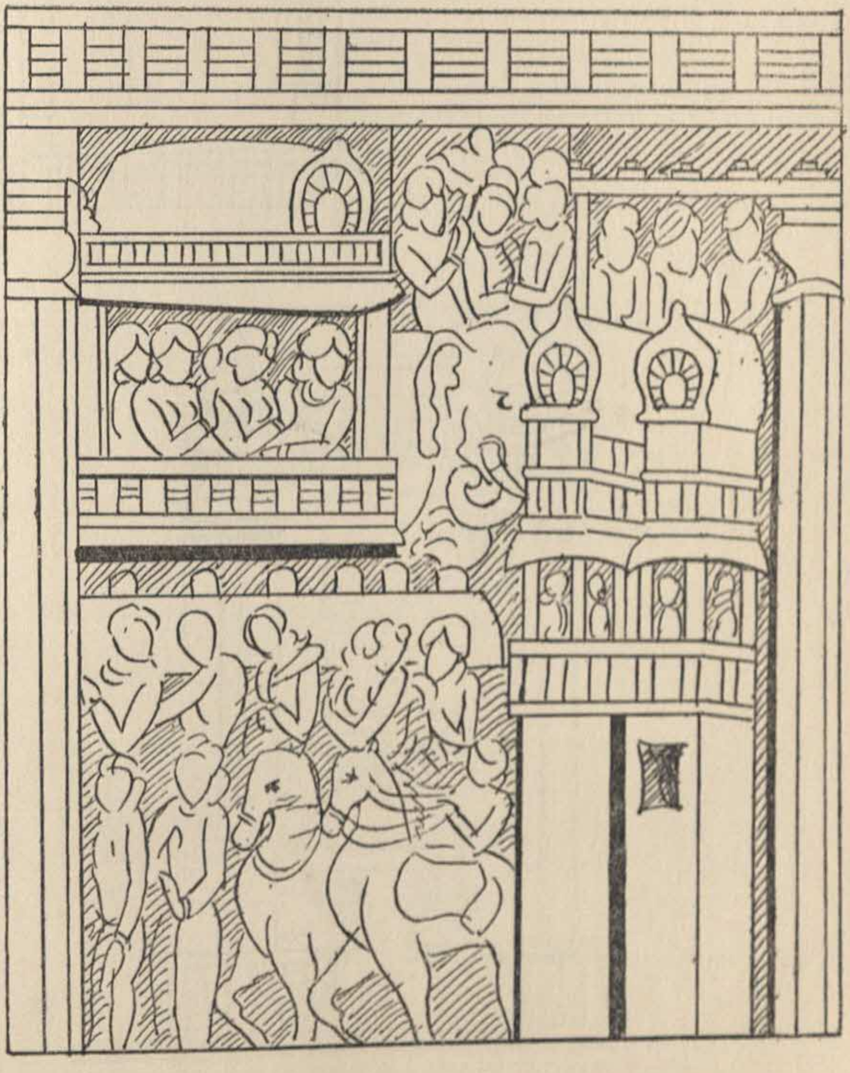

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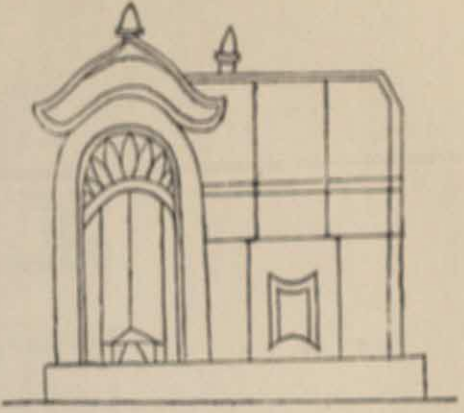

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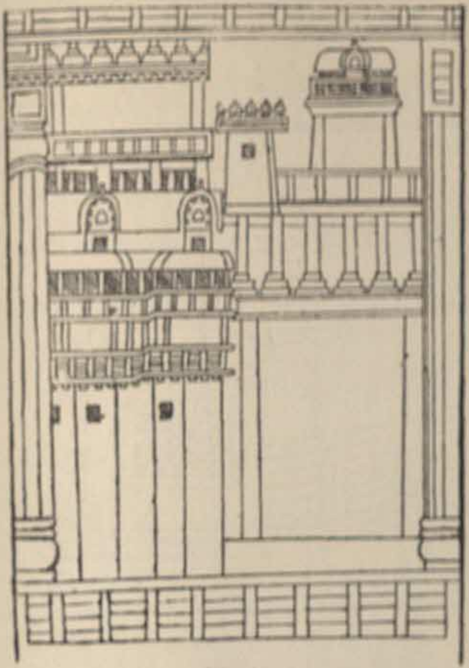

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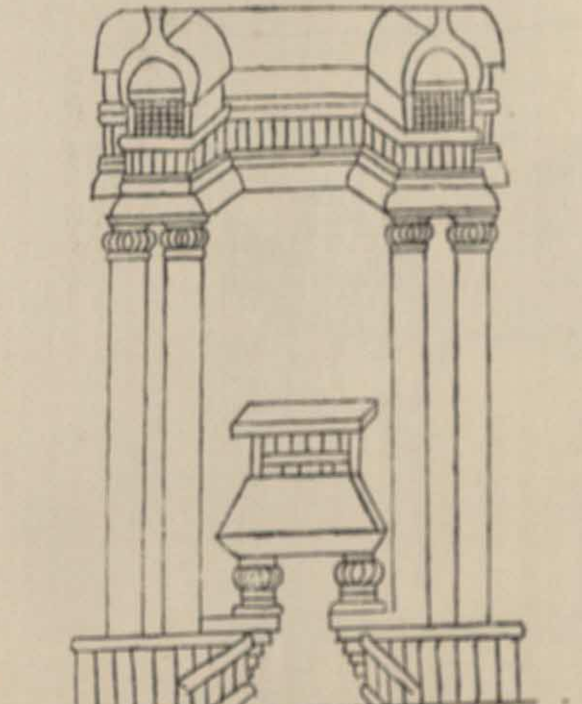

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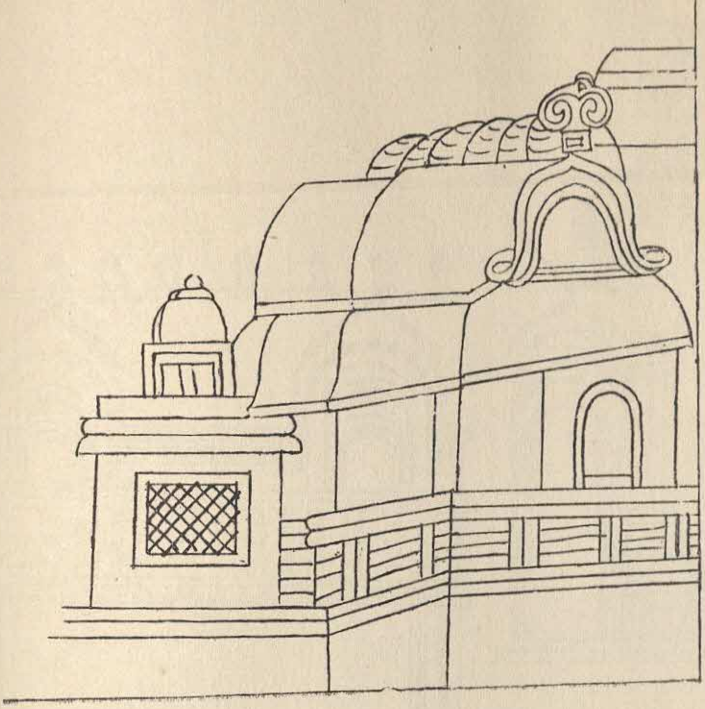

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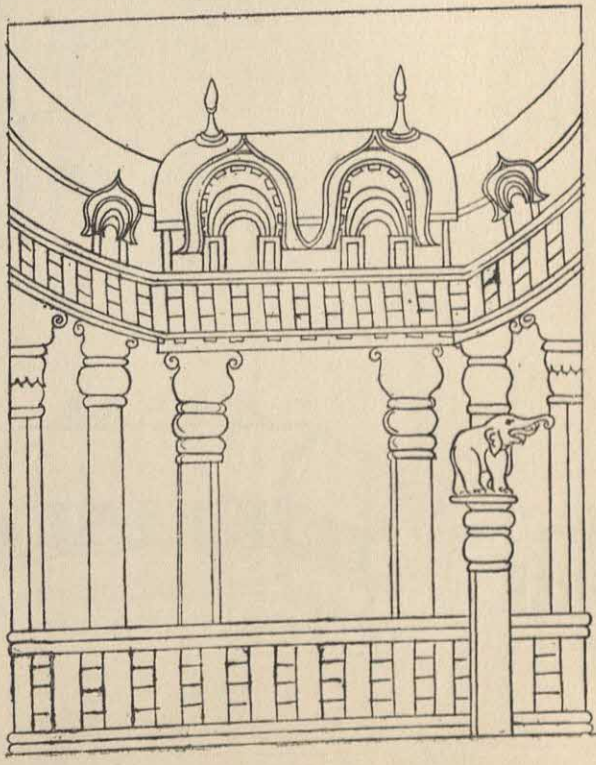

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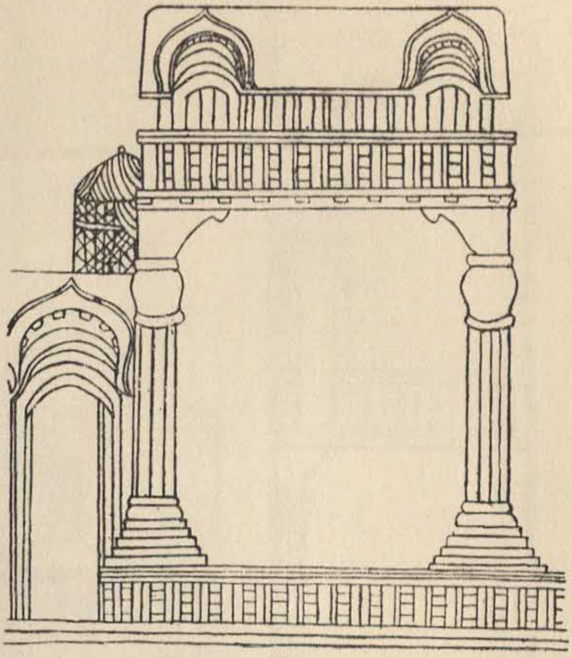

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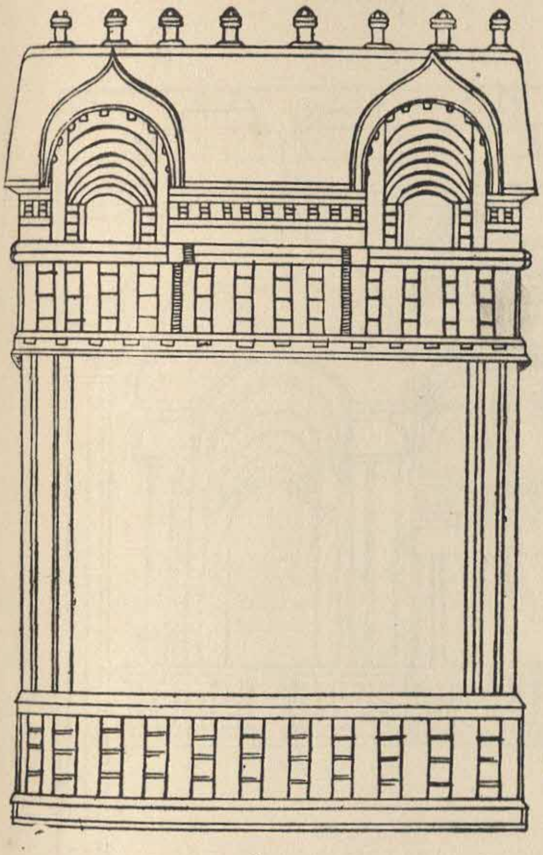

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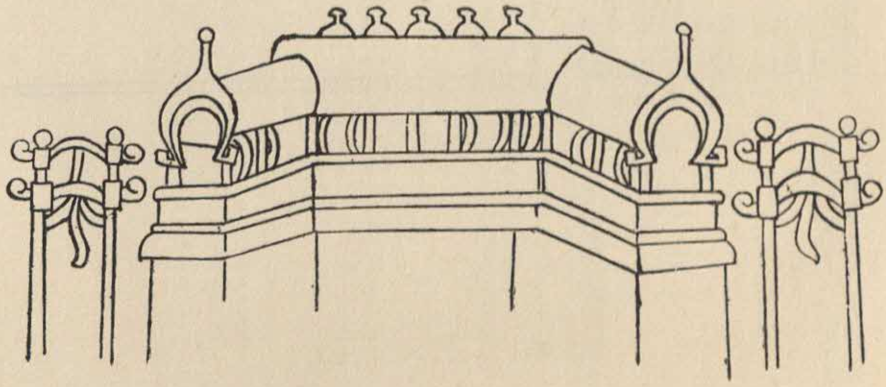

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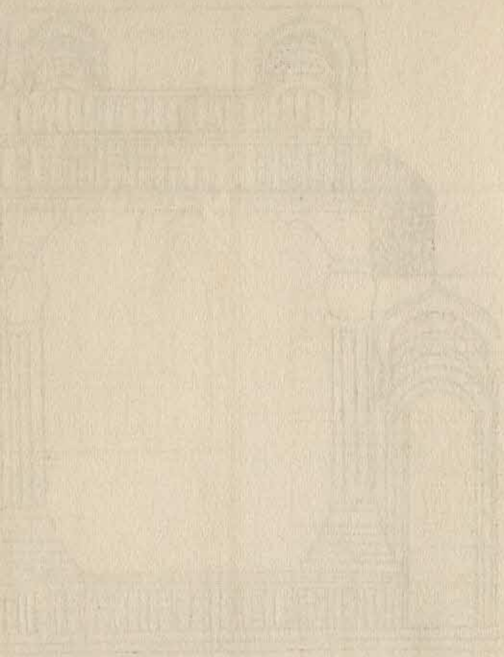

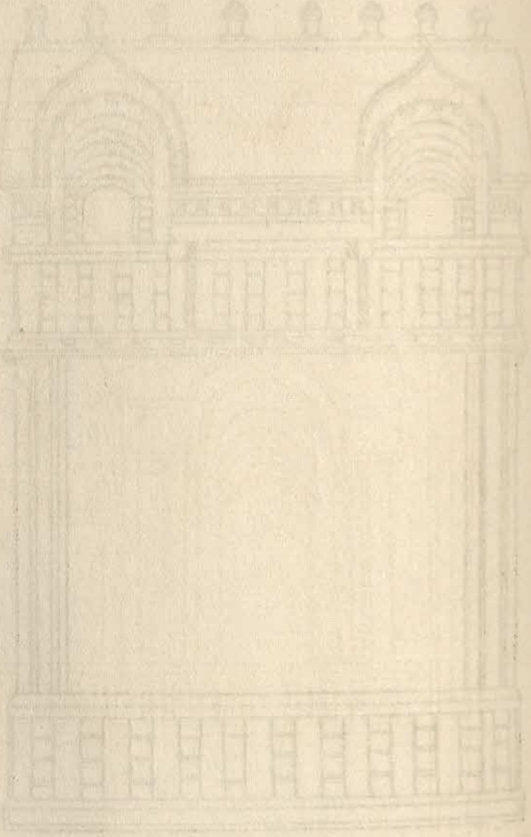

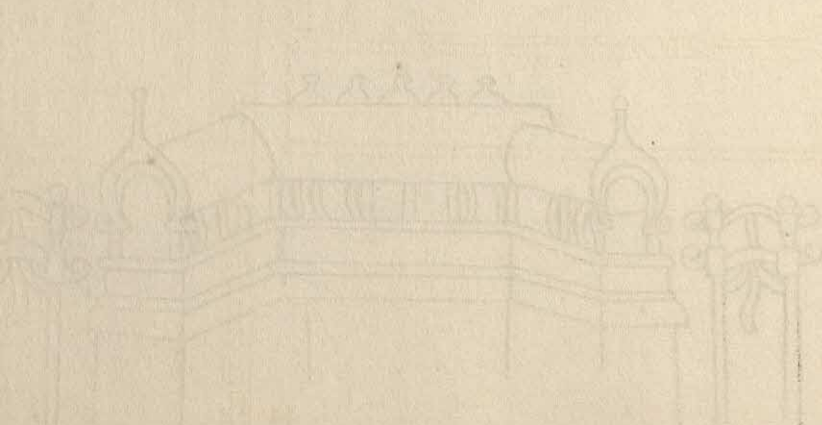

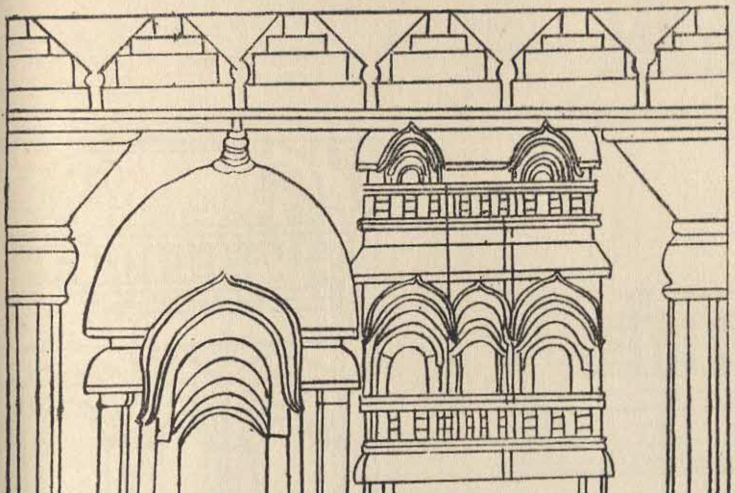

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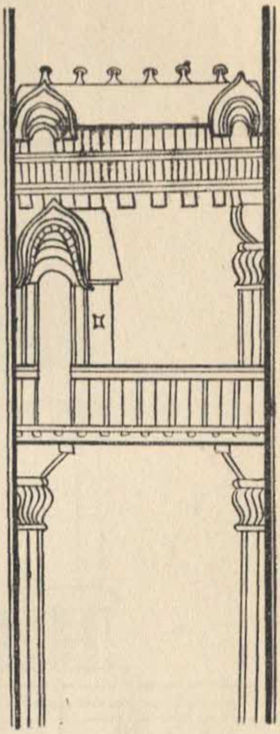

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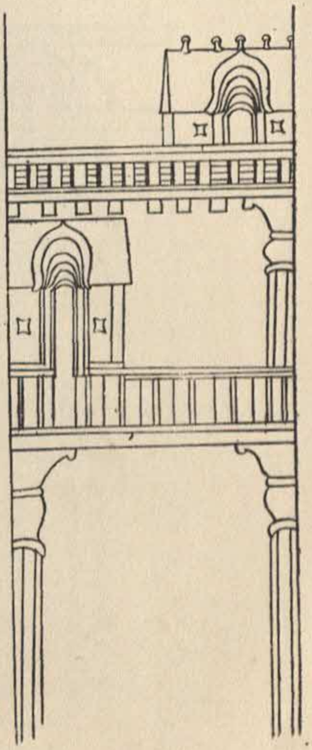

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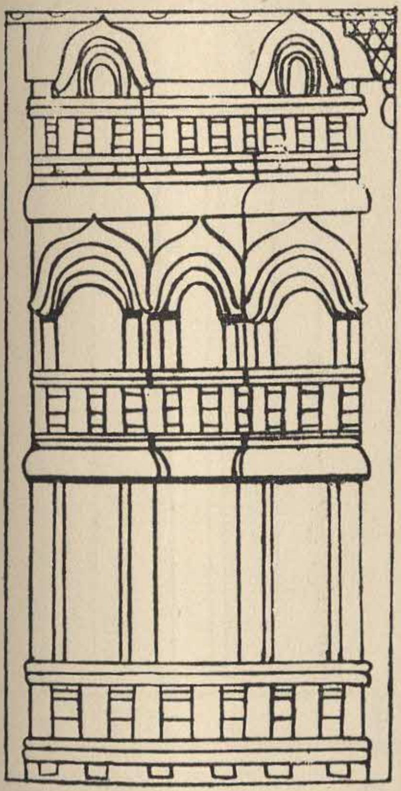

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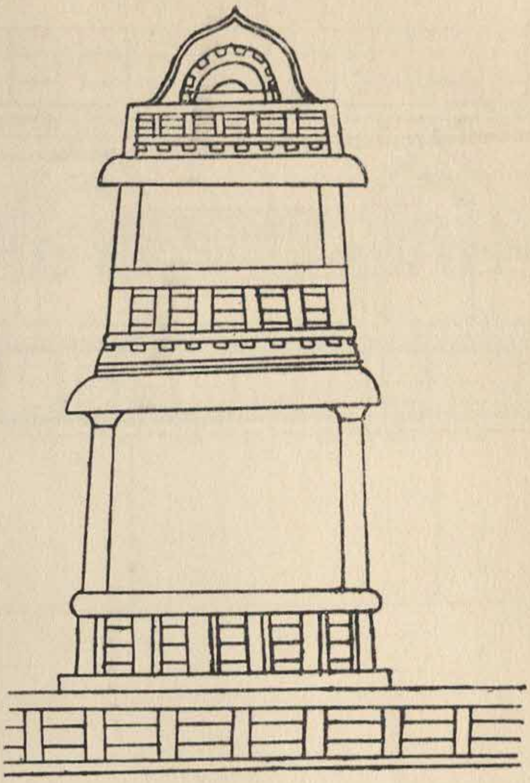

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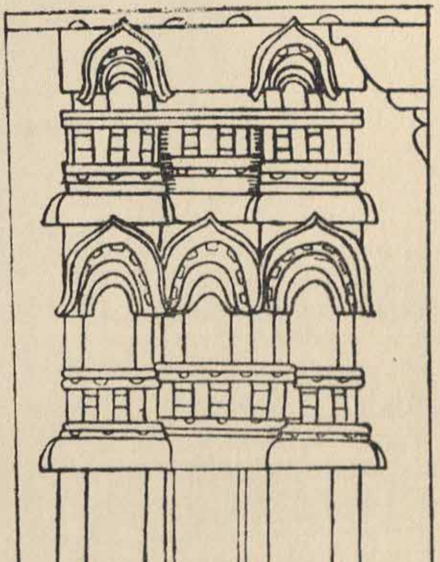

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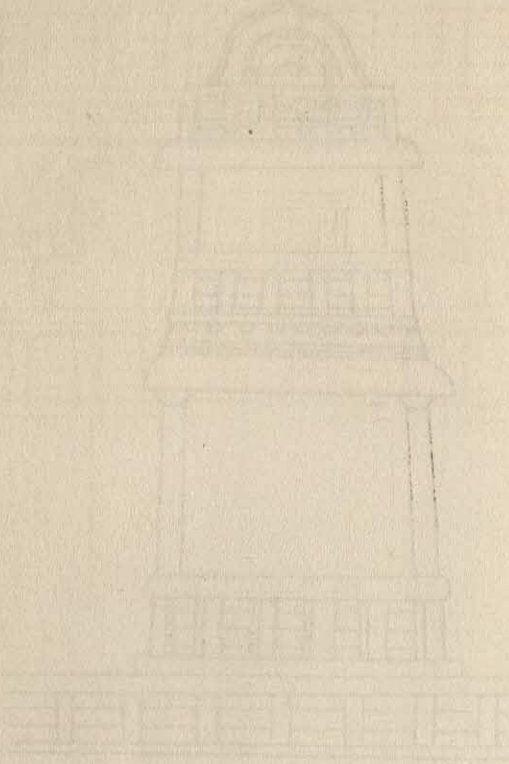

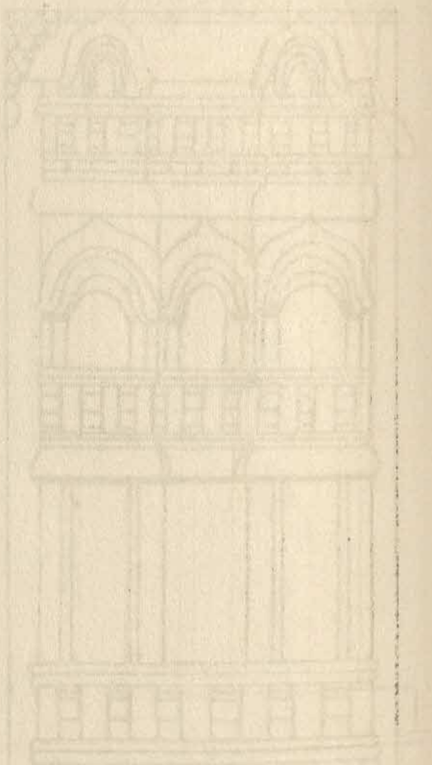

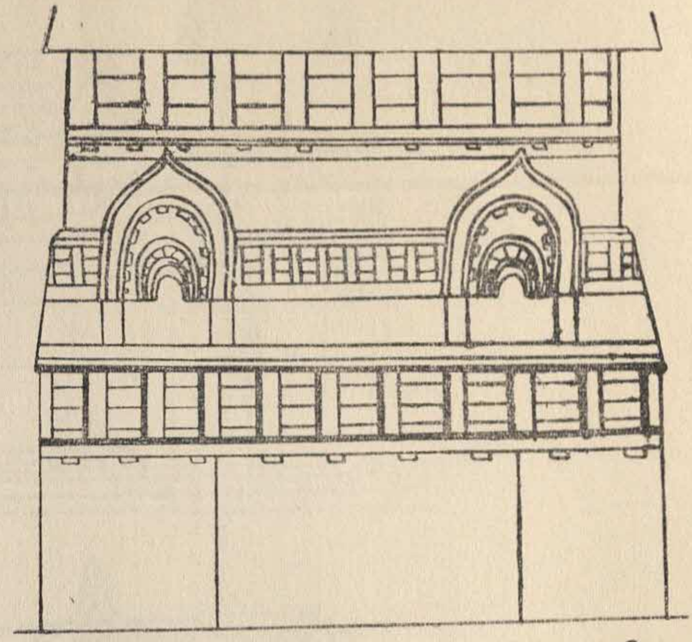

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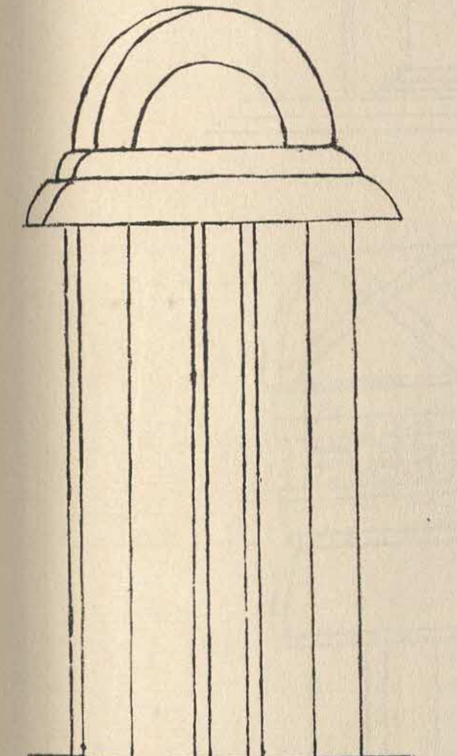

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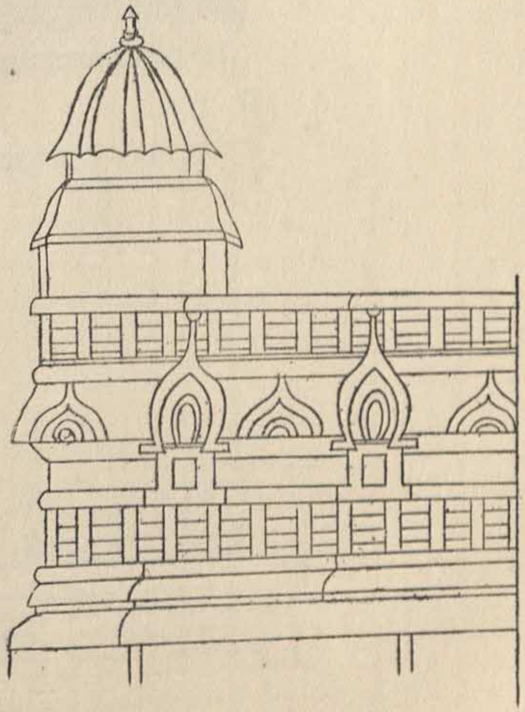

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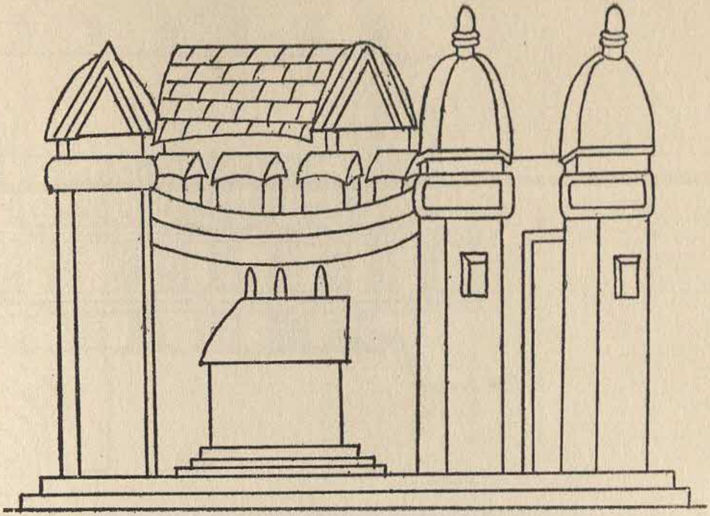

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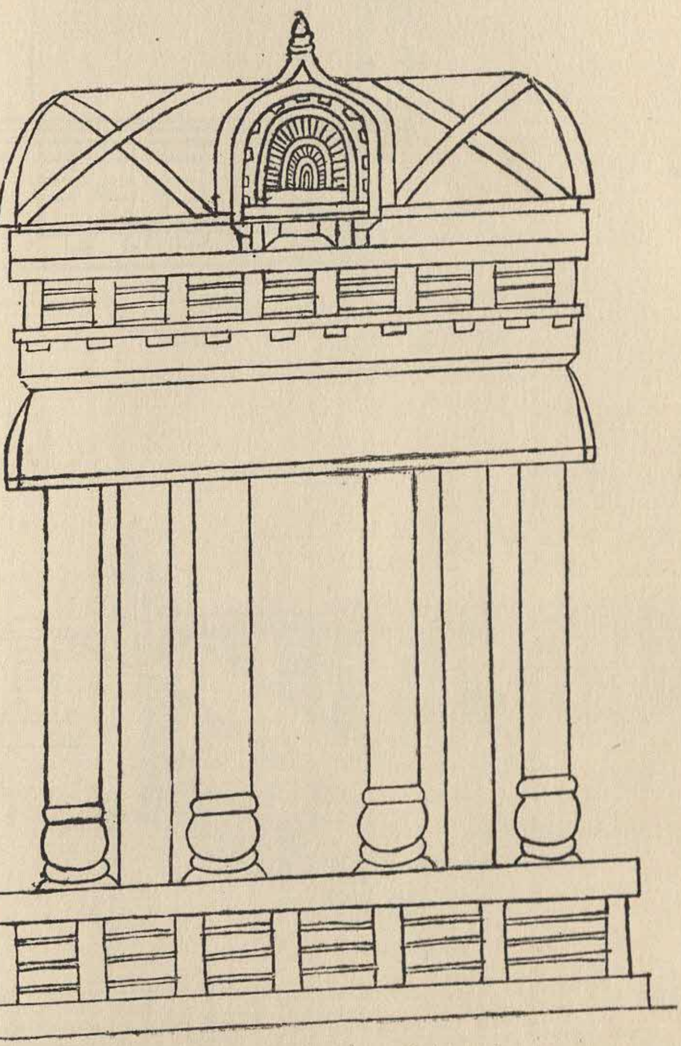

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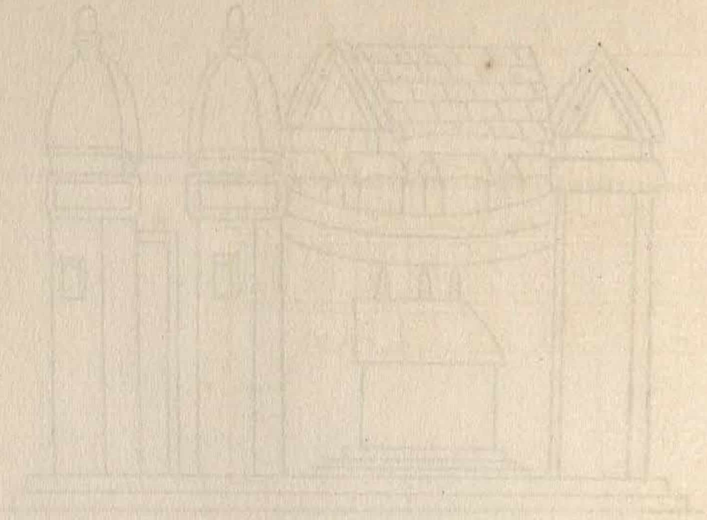

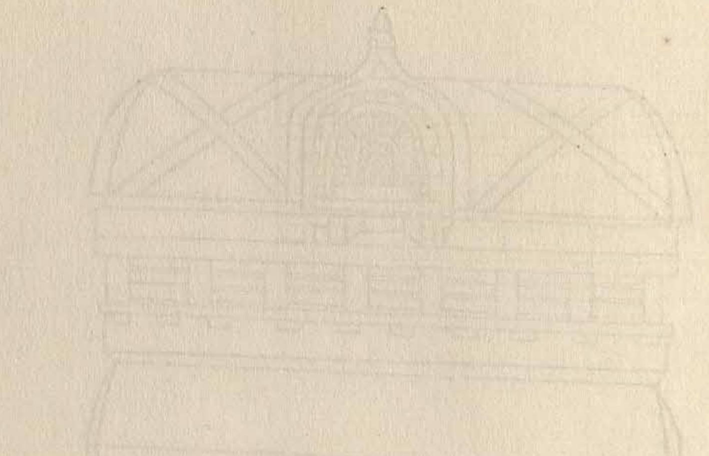

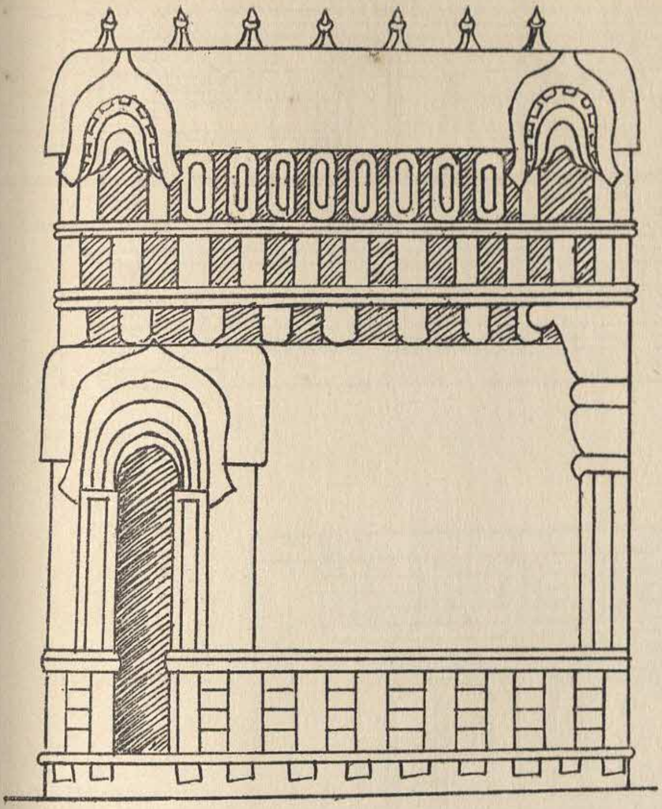

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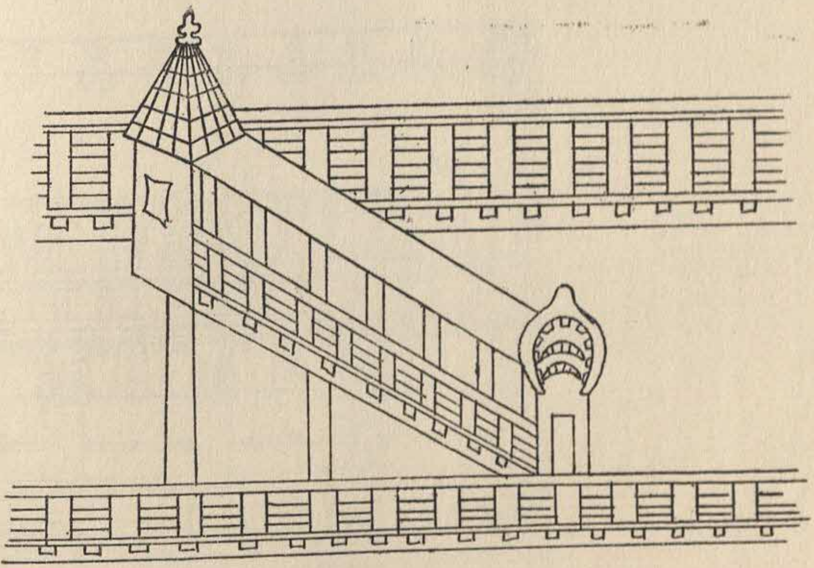

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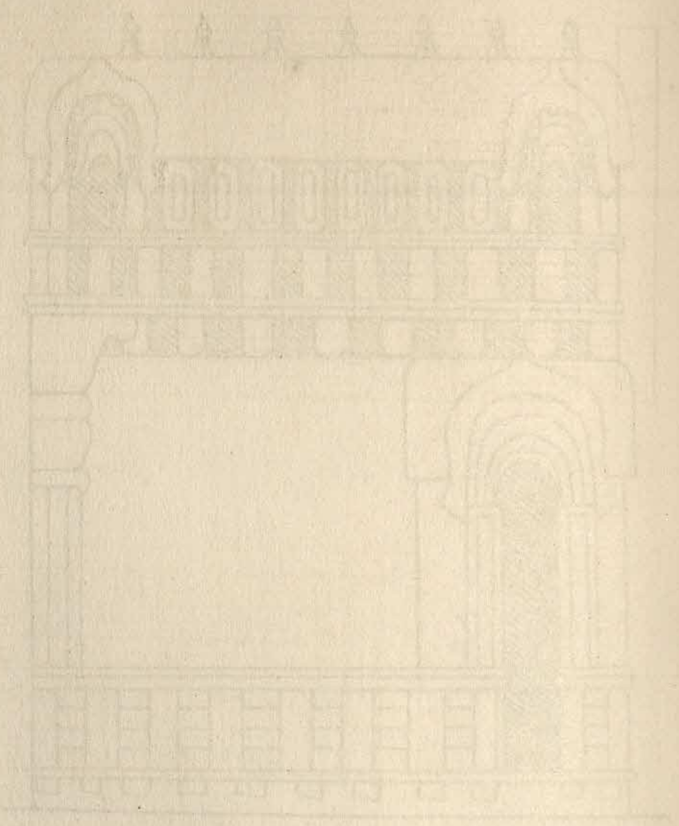

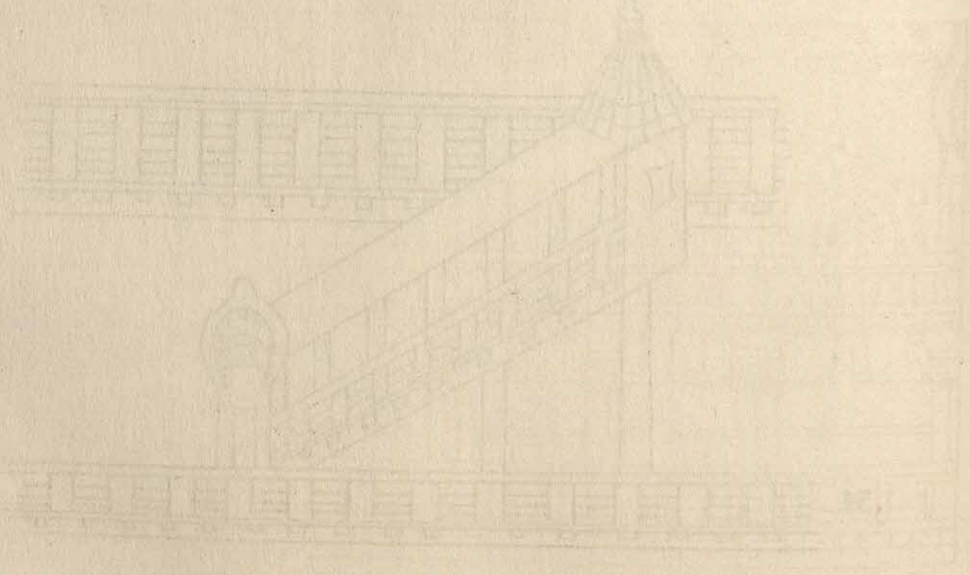

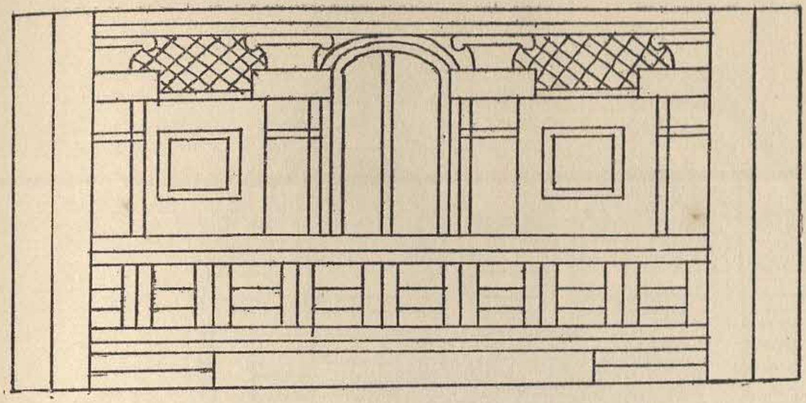
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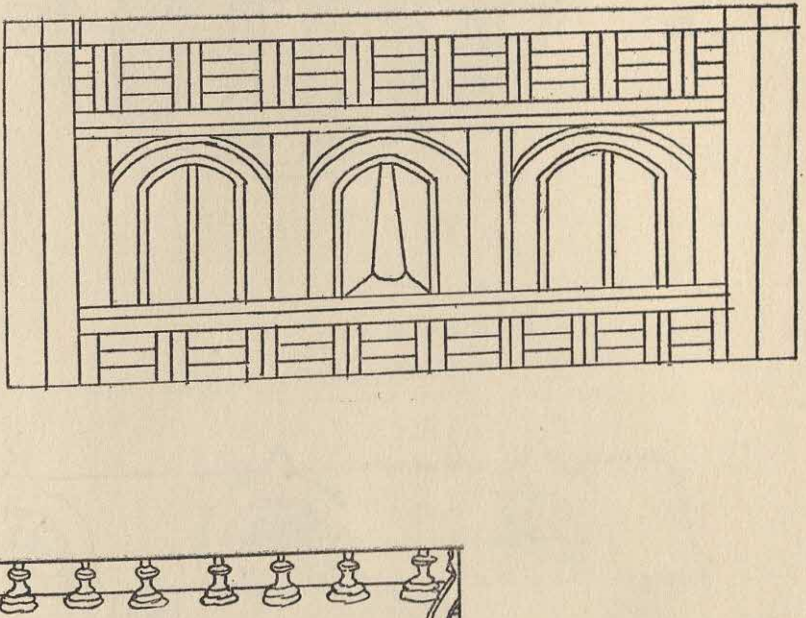
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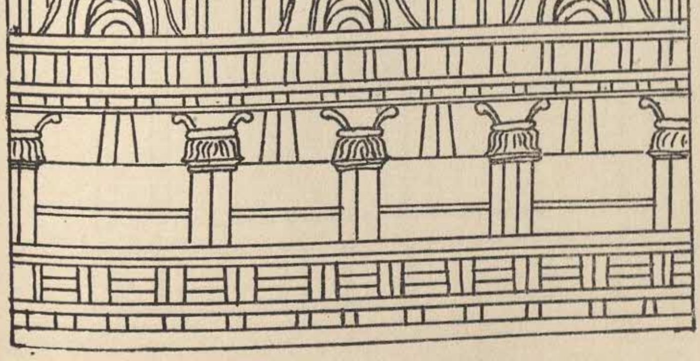
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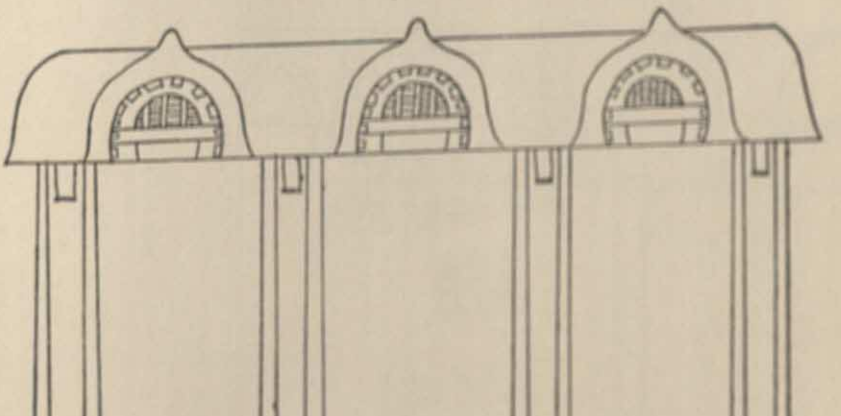

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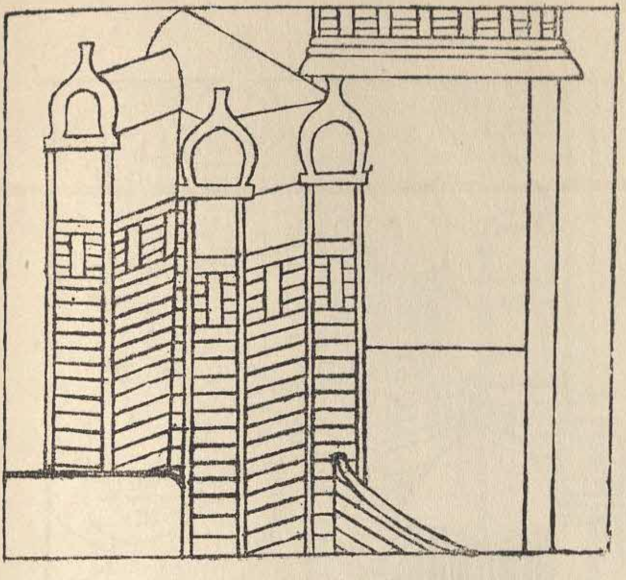

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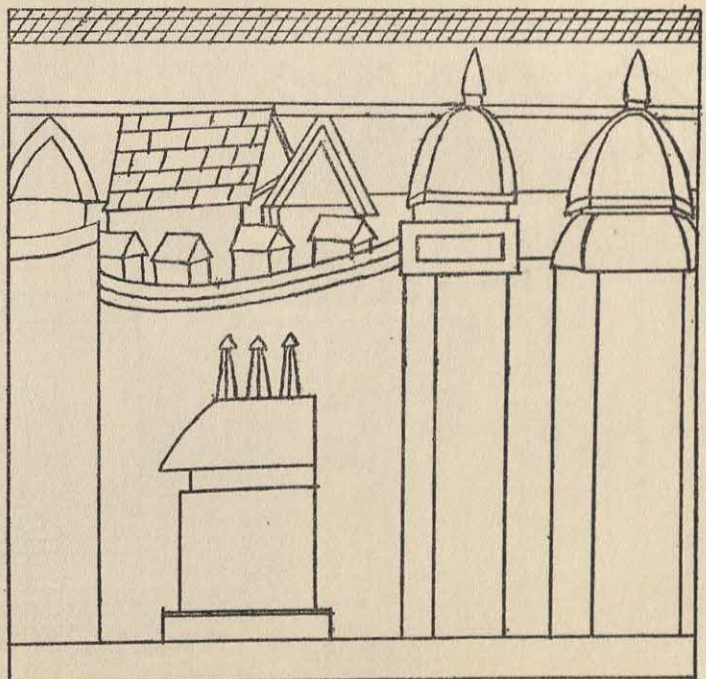

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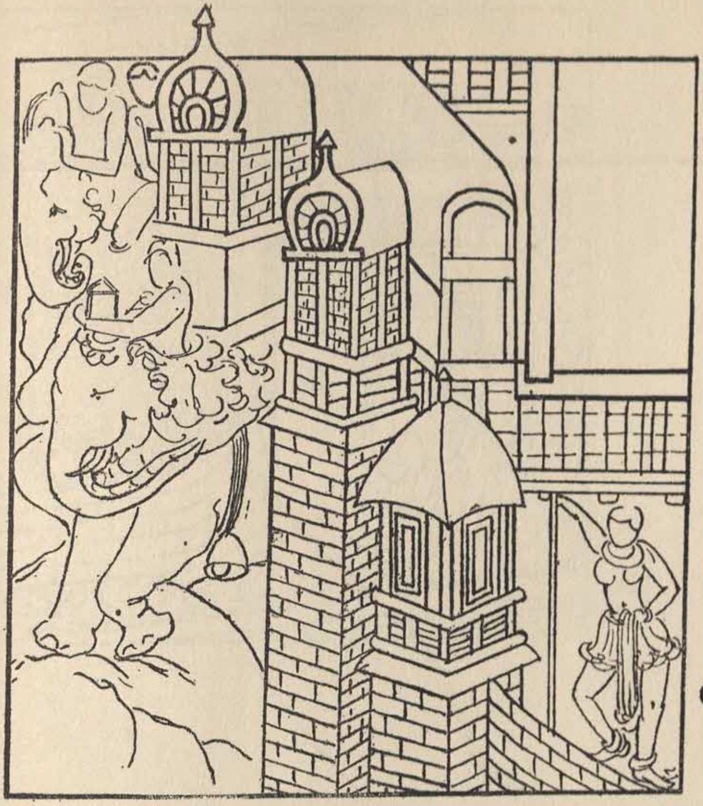

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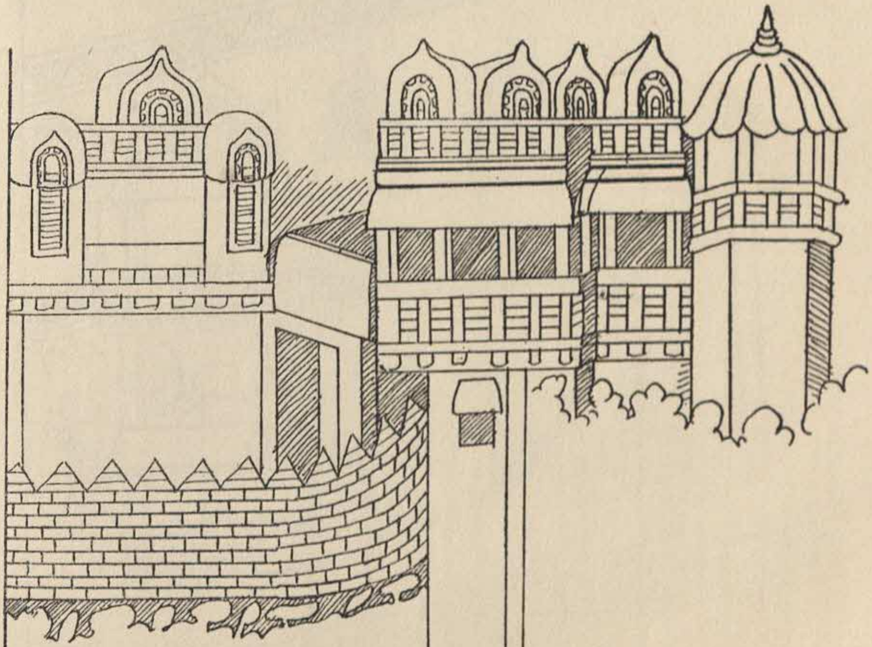

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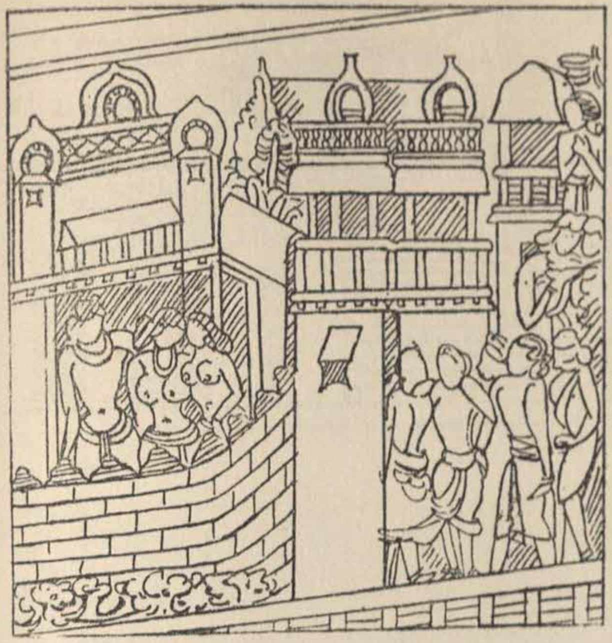

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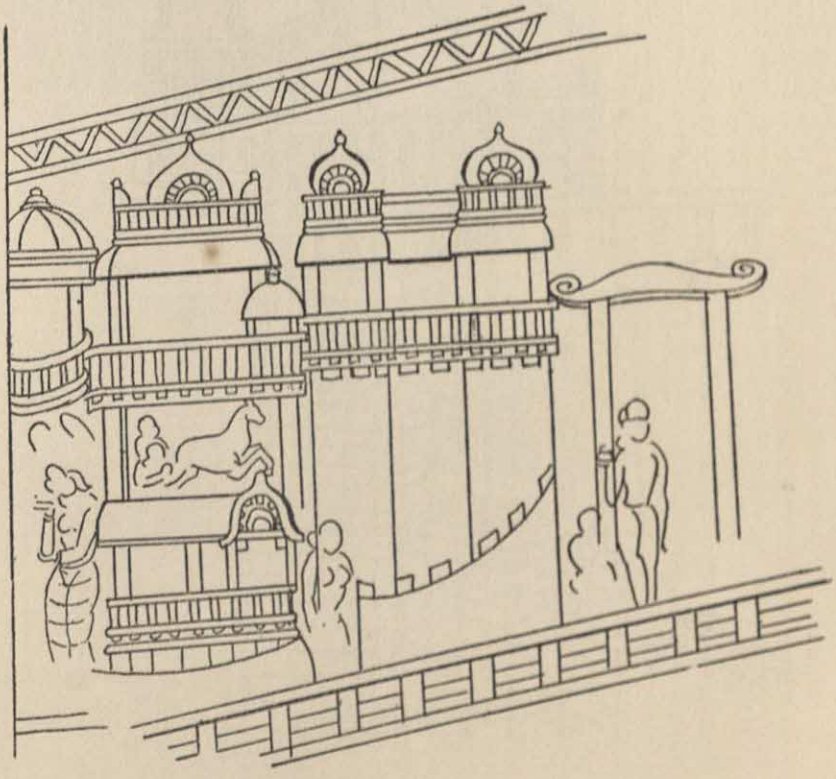

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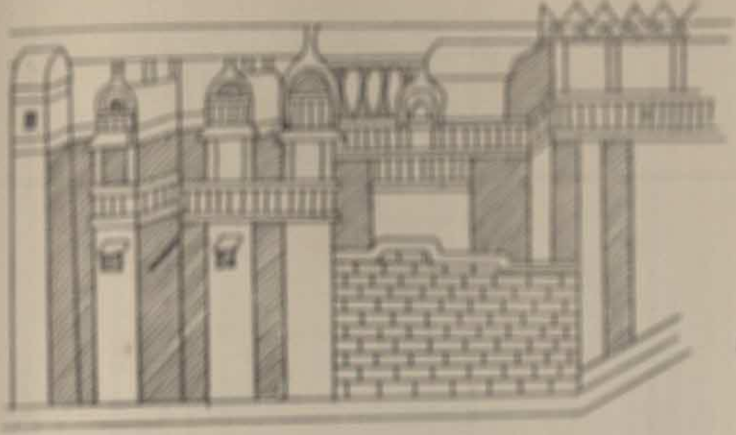

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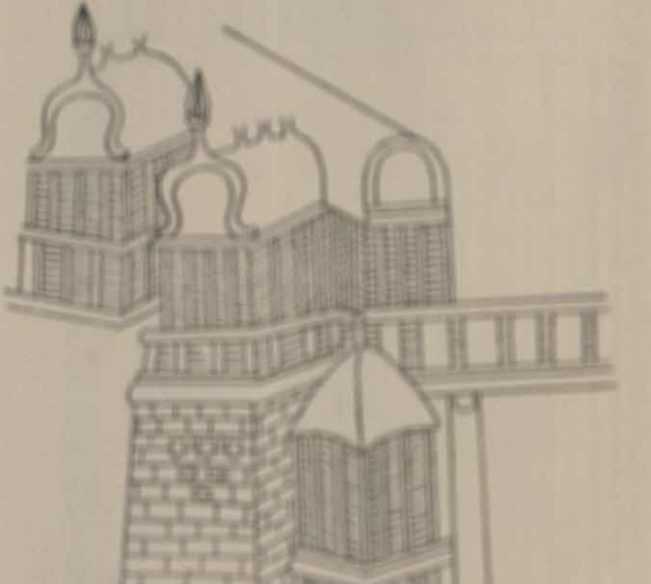

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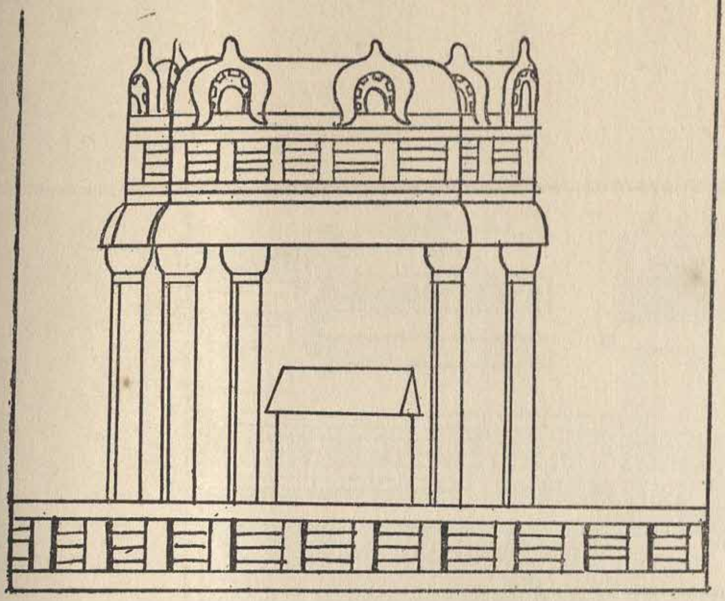

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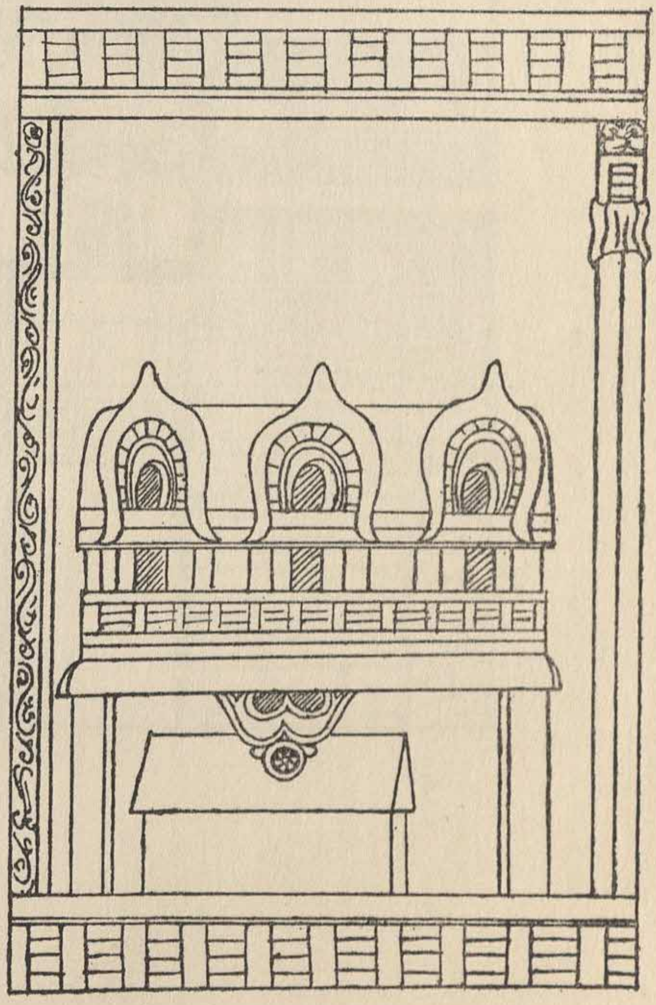

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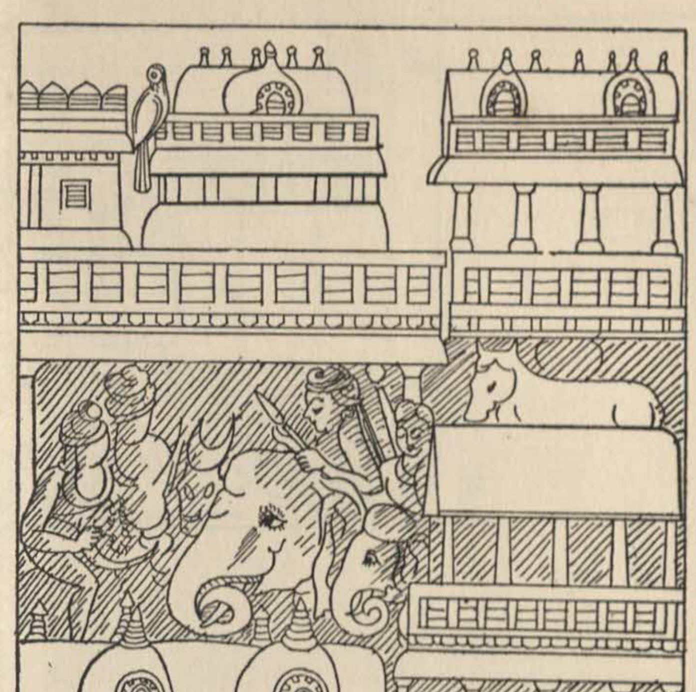

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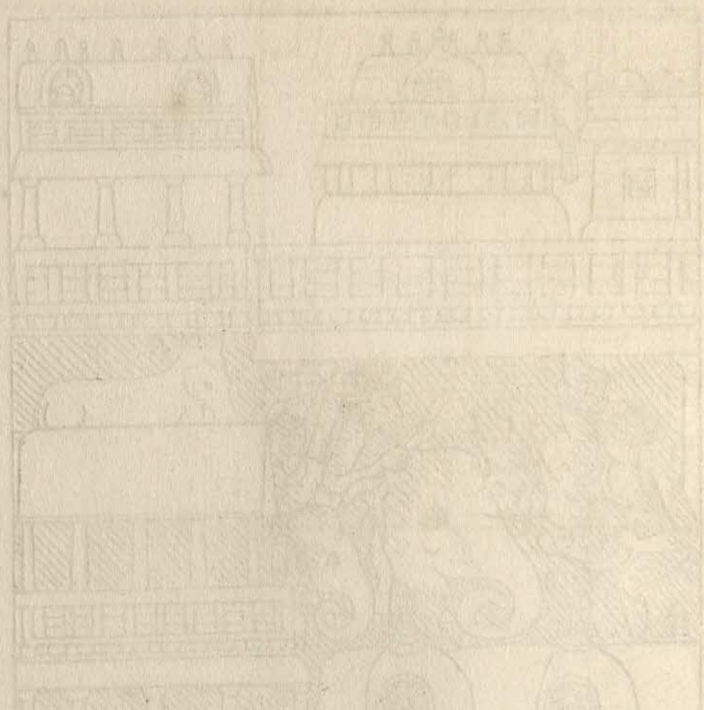

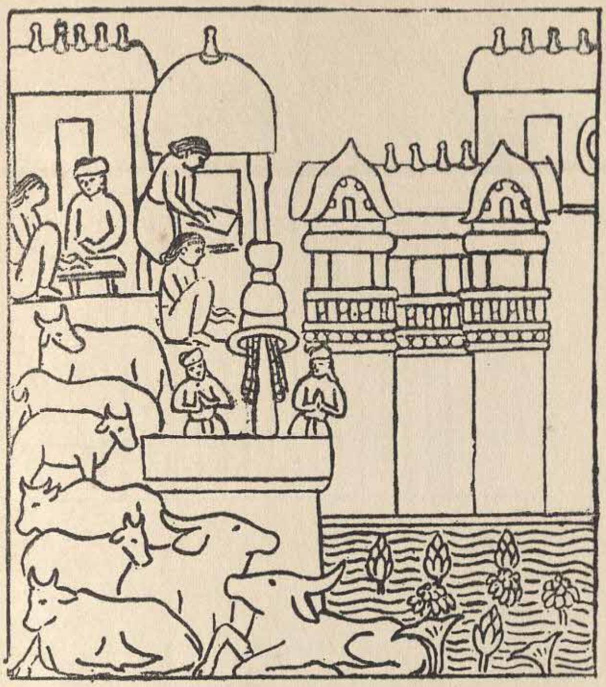

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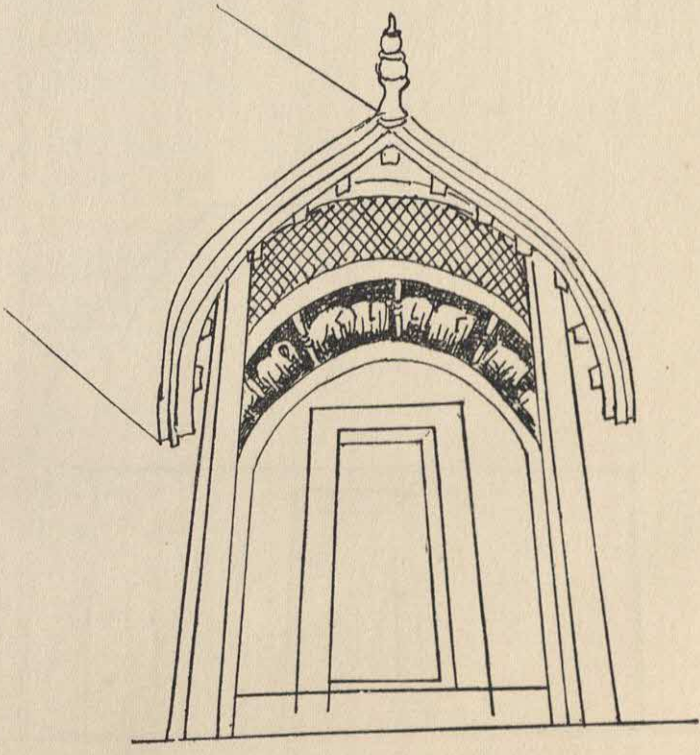

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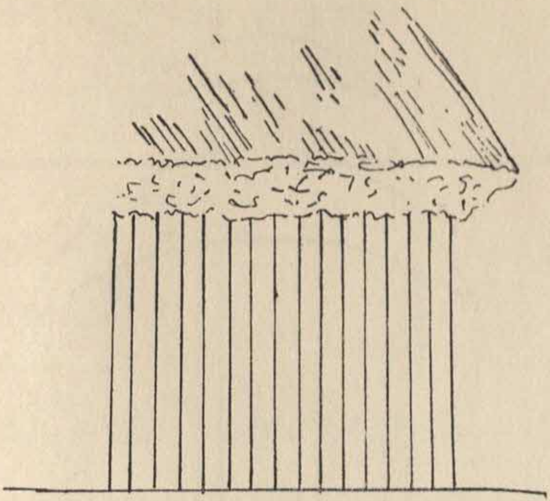

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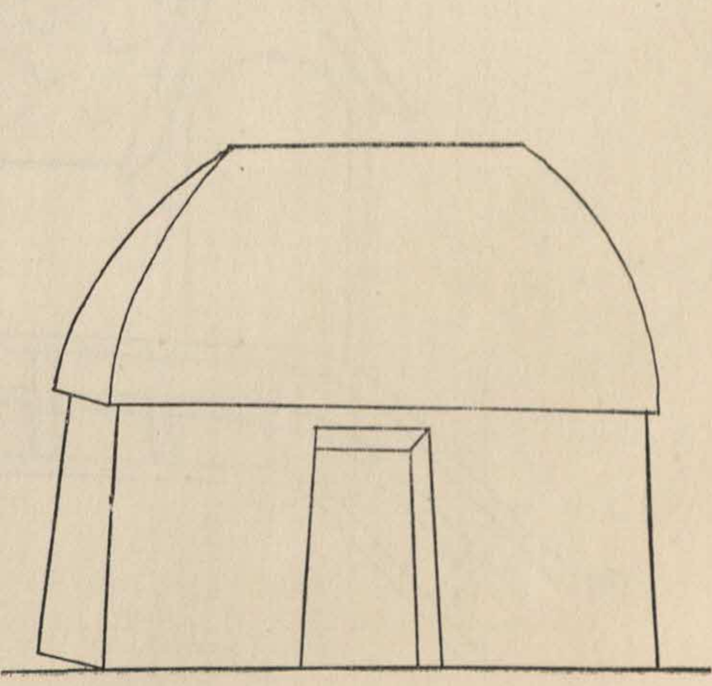

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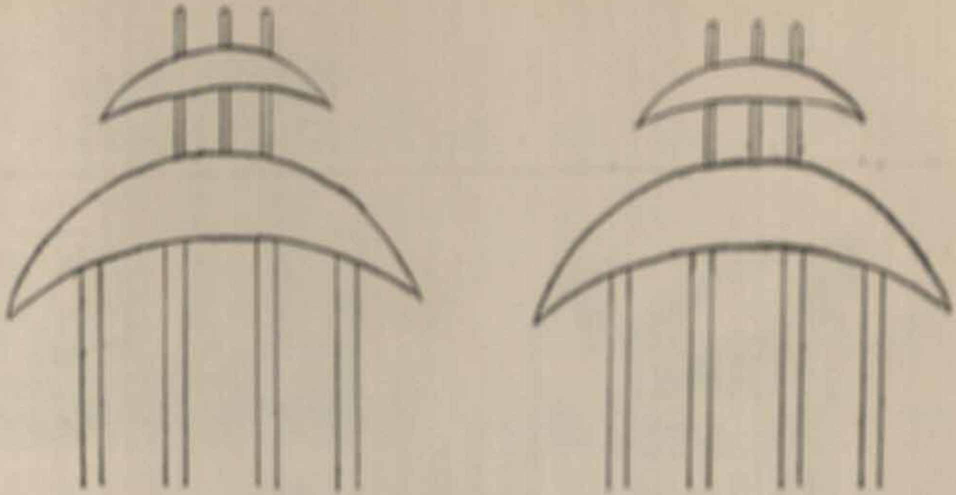
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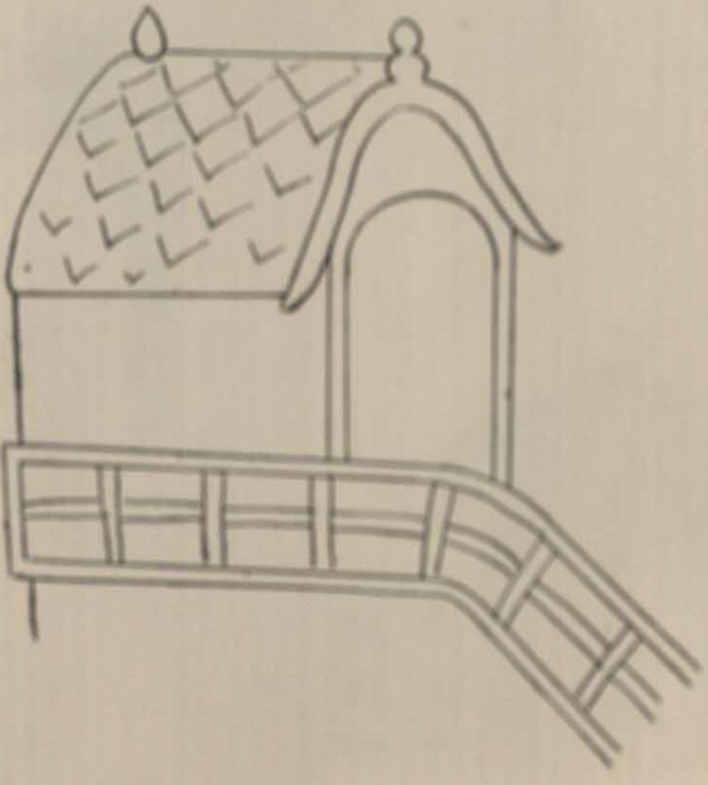
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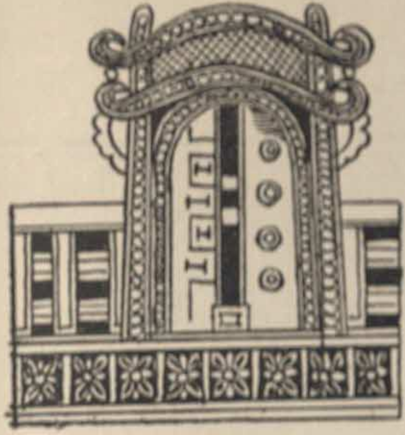

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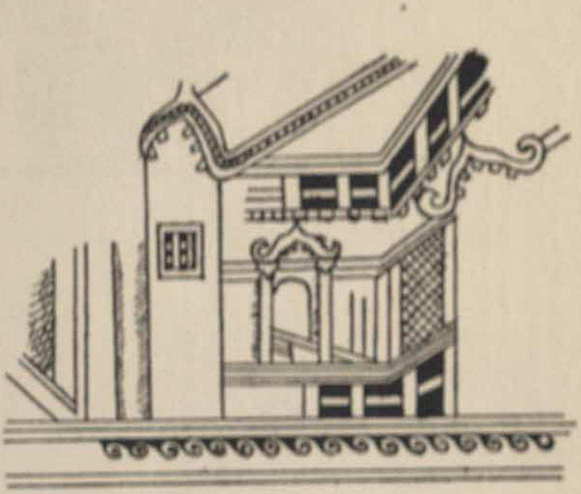

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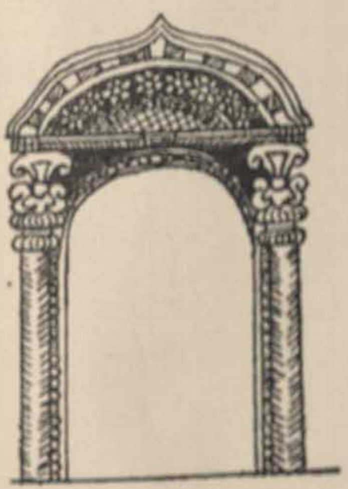

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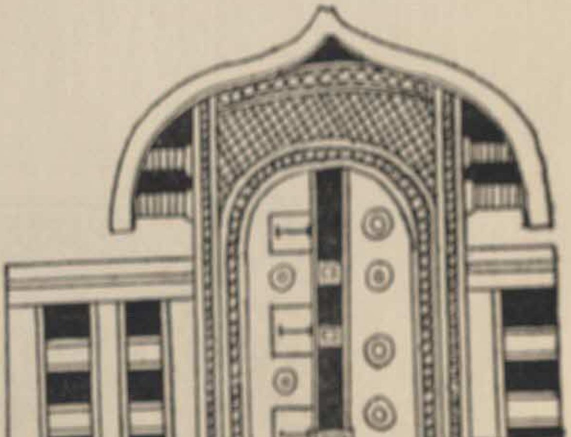

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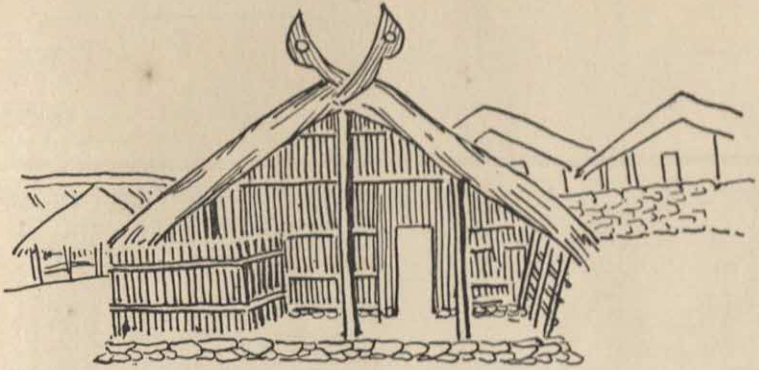

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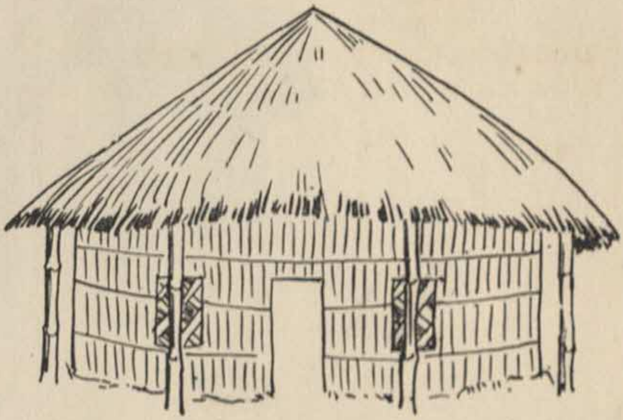

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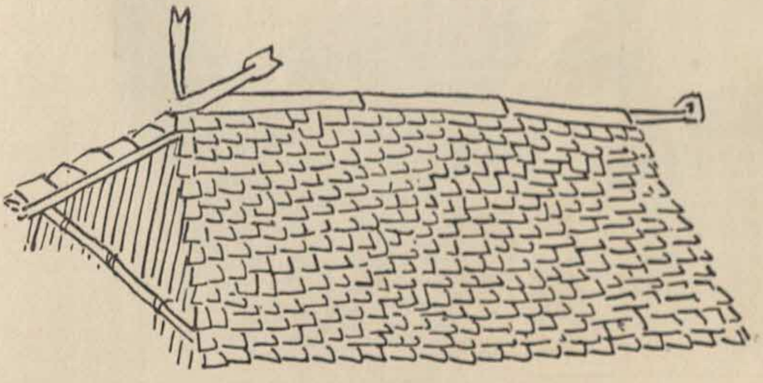

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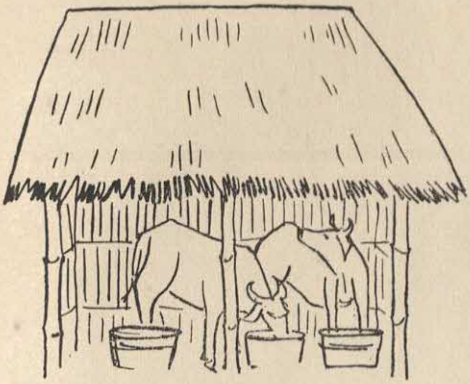

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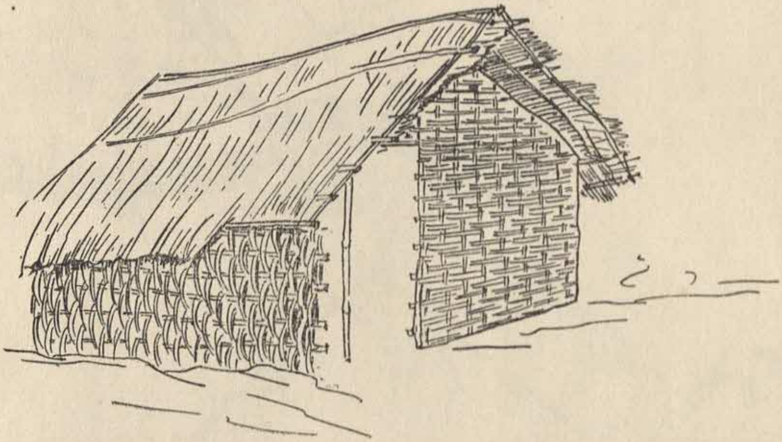

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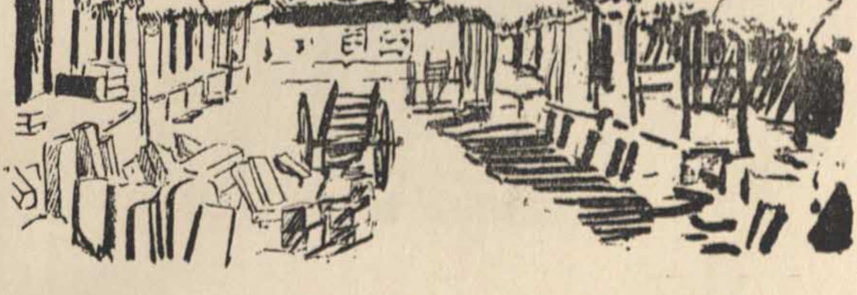

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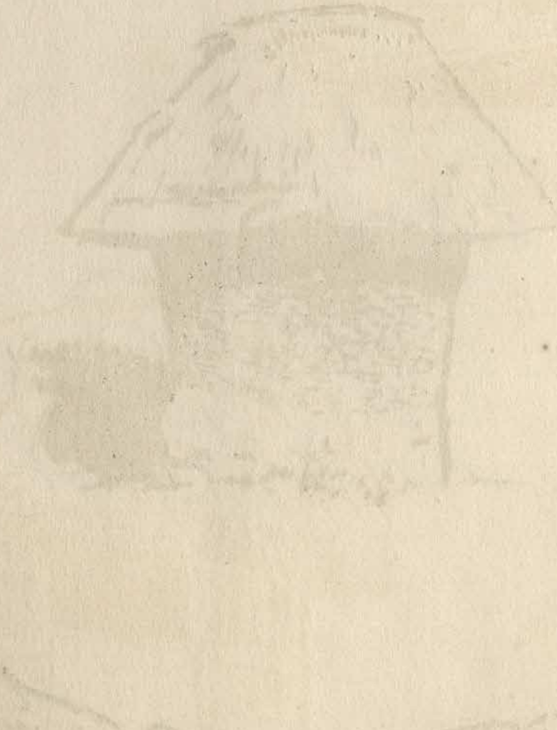

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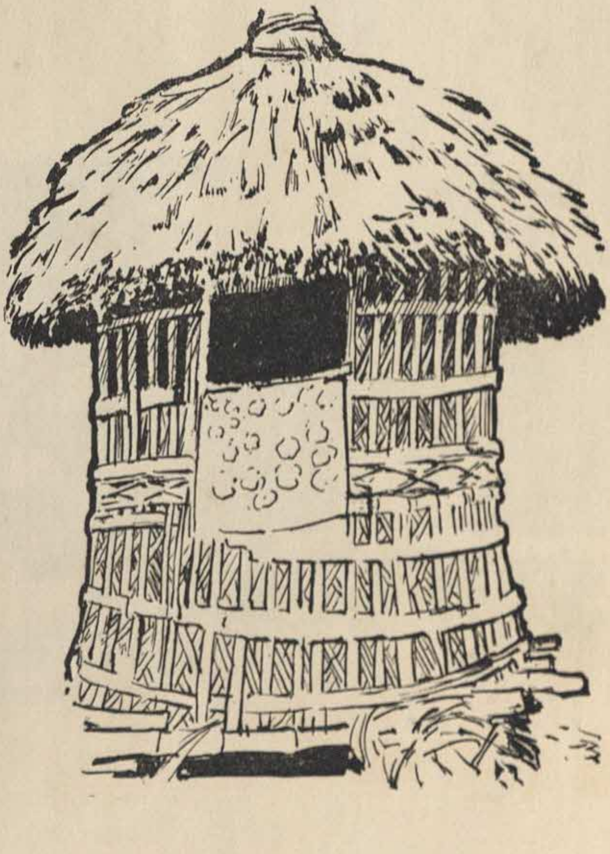

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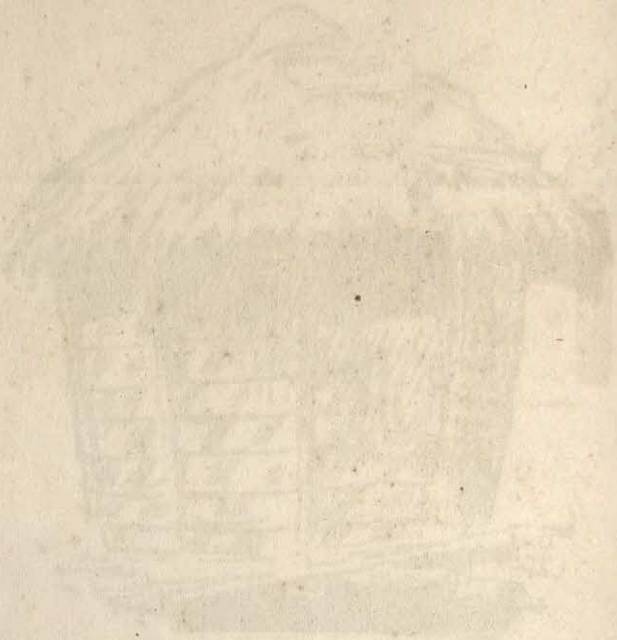

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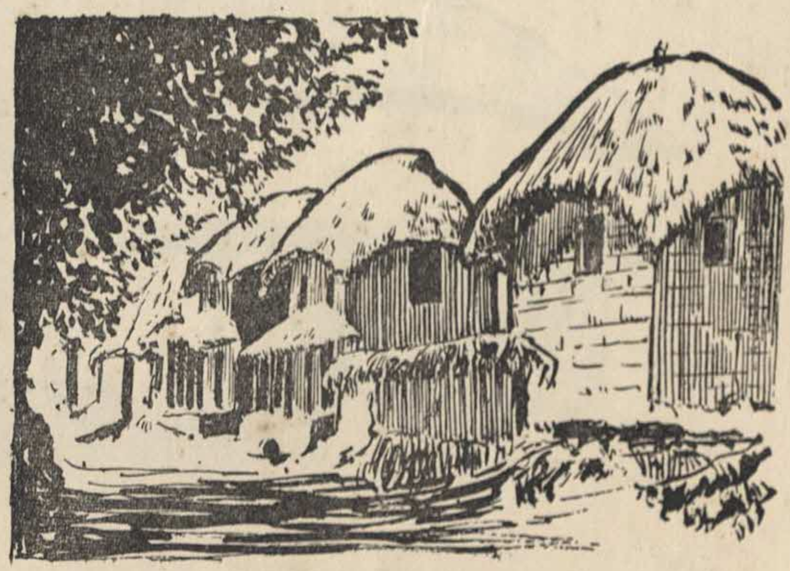

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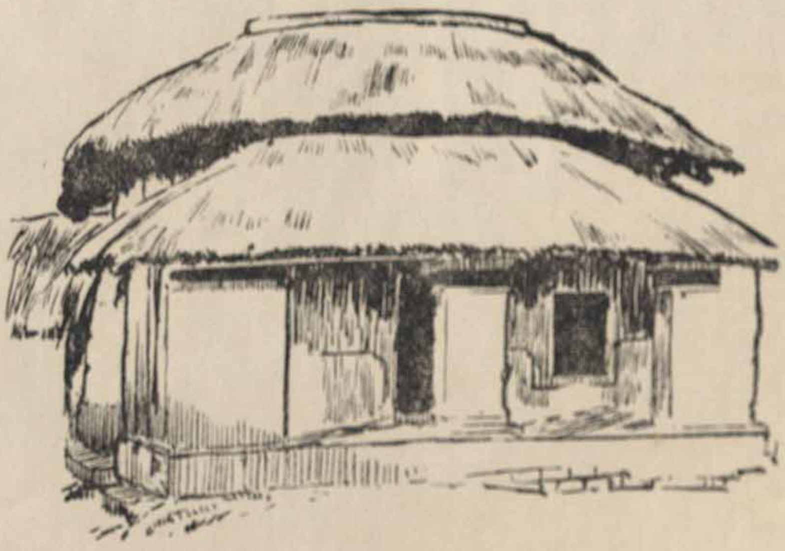

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